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Pacific PULP & PAPER Industry

PIONEERS in CHEMICALS for INDUSTRY Since 1850

ACID ACID PHOSPHATE
ALUMINUM HYDRATE
ALUMINUM CHLORIDE
ALUM
AMMONIA (Anhydrous)
AMMONIUM PERSULPHATE
BLEACHING POWDER (Standard Strength)
CARBON BISULPHIDE
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CAUSTIC SODA CHLORINE
FERRIC CHLORIDE (39% to 45% Liquid)
KRYOLITH (Natural Greenland)
PENCHLOR ACID-PROOF CEMENT
PERCHLORON (Made in U.S.A.) (Super-Test Calcium Hypochlorite)
SALT SODA ASH
SODIUM ALUMINATE
SODIUM ORTHOSILICATE (Anhydrous)
SODIUM BICARBONATE
SULPHATE of ALUMINA

Eighty-five years ago, in the year 1850, when the Iron Horse was pioneering across the pathless wilderness, the Pennsylvania Salt Manufacturing Company was organized. Since that time, many economical manufacturing methods have been developed by the Salt Company, permitting reasonable costs of raw materials to American Industry. Among these basic chemical commodities is Liquid Chlorine.

Chlorine was first produced at our Wyandotte Works in 1892, being absorbed into lime for shipment as bleaching powder. In 1909 the first tank car of Liquid Chlorine shipped in the United States moved from our plant. In the subsequent steady improvement of shipping containers, manufacturing methods, and field missionary work on this commodity, the Pennsylvania Salt Manufacturing Company has played a leading part.

The construction of its Tacoma Plant in 1928 provided the Pacific Northwest with a well balanced chemical plant capable of supplying on short notice Liquid Chlorine to pulp and paper mills.

Eighty-five years of dependable shipping schedules has been reflected in our customers' satisfaction.

PENNSYLVANIA SALT MFG. CO. OF WASHINGTON

TACOMA, WASHINGTON

Branch Sales Offices: New York — Chicago — St. Louis — Pittsburgh — Wyandotte

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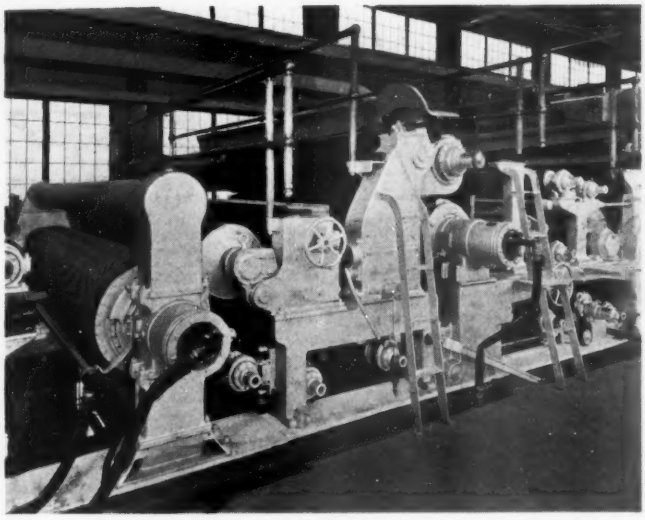
BELOIT EQUIPMENT *in* NEW WEYERHAEUSER MILL

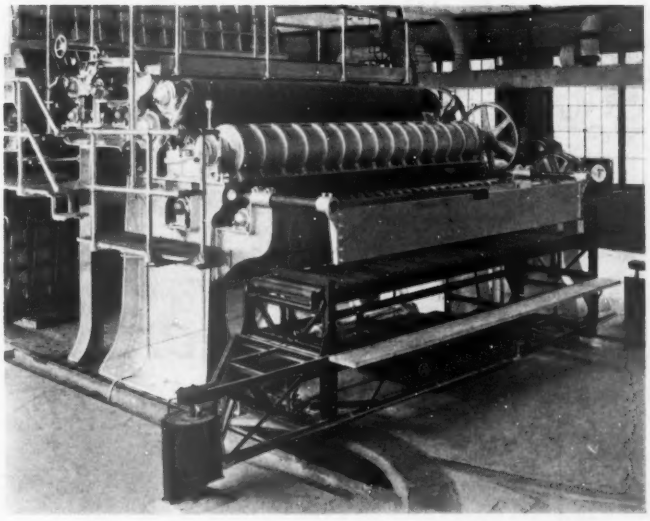


Beloit Suction Couch and Beloit Suction Press

Couch is Drilled Special for Operation with Pressure Roll

Beloit Heavy Duty Pulp Cutter and Sheet Stacker

Built Special for This Installation



This Beloit Equipment Furnished Thru Rice, Barton & Fales

The Beloit Way is BELOIT IRON WORKS PAPER MACH'Y BELOIT, WIS. ***the Modern Way***

BELOIT IRON WORKS, Beloit, Wisc., U.S.A.

"NON-USERS ARE THE LOSERS"

FINISH AND TRIM

TENAX FELTS

No Summer Slump with TENAX

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...When you clothe your machines with TENAX FELTS, you put on clothing tailored to fit and perform "early and late."

They help you keep your schedules by giving Finish, Trim, and Water Removal at minimum cost.

Today **TENAX FELTS** combine the accumulated knowledge and experience of our forty-four years spent in one line only, and that line is---

Making
Papermakers' Felts

"Non-Users Are the Losers"

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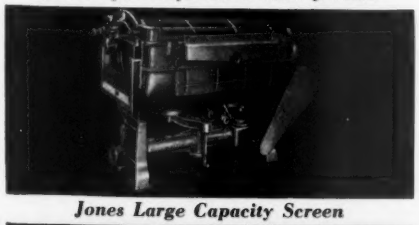
LOCKPORT FELT COMPANY

NEWFANE, NEW YORK

Pacific Coast Representative: ALAN C. DUNHAM, Portland, Ore.

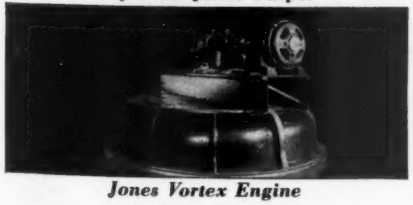
New Jones Multibeater

Jones Split Adjustable Shell Jordan



Jones Large Capacity Screen

Improved Jones Pulper



Jones Vortex Engine

And Jones' equipment performs each operation in stock preparation with thoroughness and low power consumption.

You are invited to judge Jones' Pulpers, Beaters, Jordans, Screens and other products, as separate units. Check each as to resulting quality of finished paper, speed, and operation and power costs. Then you will appreciate why so many prominent mills in the United States and Canada are Jones equipped.

Are you interested in new equipment? Let Jones submit a proposition for a balanced installation. Do you wish to modernize your present set-up to reduce production costs and improve product? Jones likewise is ready with pertinent suggestions. In any event, send for the latest literature. Write today.

E. D. JONES & SONS COMPANY

PITTSFIELD, MASS.

Jones

BUILDERS OF HIGH GRADE MACHINERY FOR PAPER MILLS

How SHELL can help you fight

"Watered Oil"

– *the Paper Industry's* ENEMY NUMBER ONE!

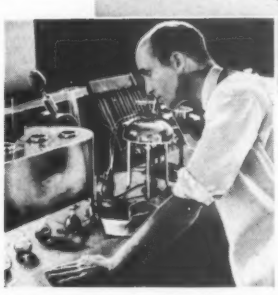
Emulsified oil is far more dangerous than oil into which you poured water before using!

OIL THAT has emulsified badly —literally "watered oil"—is the biggest single reason paper mill lubrication costs are usually so high.

Shell engineers have done some fine work on this problem in recent years. *The result is a line of Shell lubricating oils which are highly resistant to emulsion.*

These perfected Shell oils fight off water. Under adverse conditions, they hold their body. That means more hours of lubrication per gallon of oil.

More important, it means reduced wear—and fewer breakdowns.

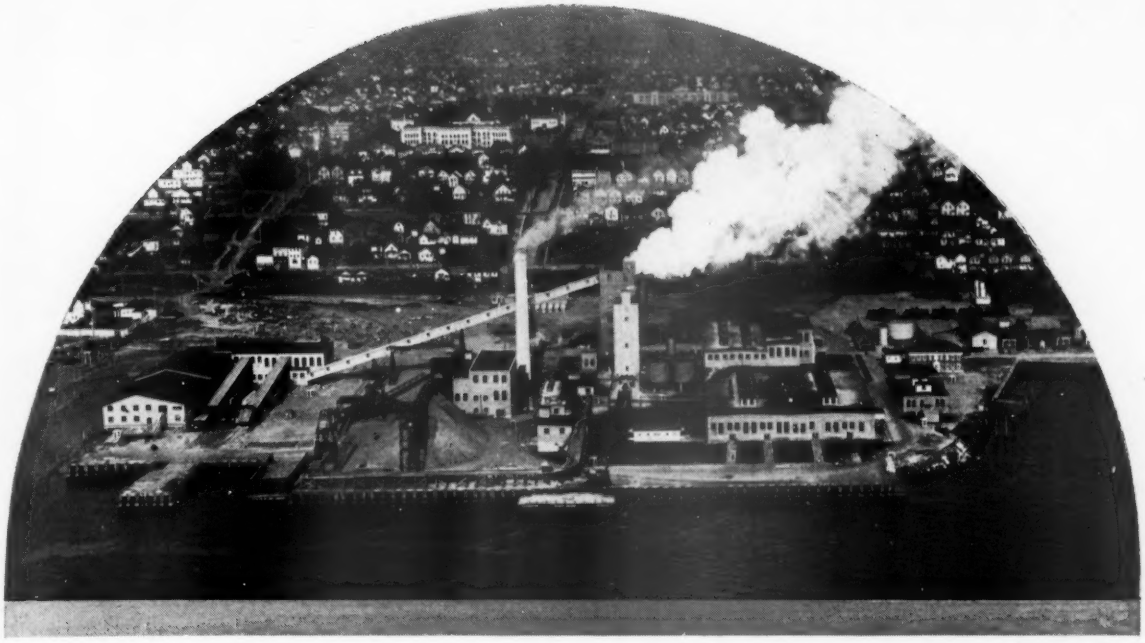


Hundreds of tests were made before Shell engineers found the answer

Ask us for the names of actual users in the Northwest. Find out what a dollar and cents difference these remarkable Shell Mill Lubricants can make. Phone or write to nearest Shell office today.

SHELL **MILL LUBRICANTS**

Engineered to cut lubrication costs



HIGH GRADE
BLEACHED
SULPHITE PULP

SOUNDVIEW PULP COMPANY

EVERETT, WASHINGTON

FROM ACID PLANT TO MACHINE ROOM

STEBBINS LININGS

ARE TO BE FOUND IN THE
NEW WEYERHAEUSER
UNBLEACHED SULPHITE PULP
MILL IN EVERETT

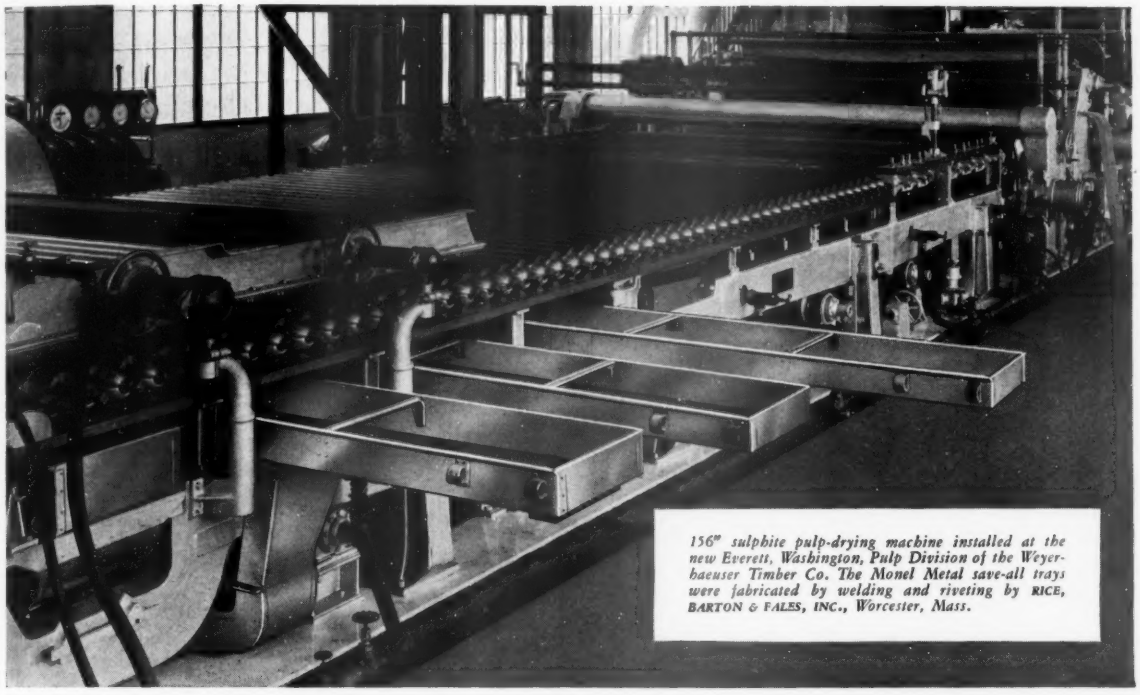
SULPHUR BURNER LINING
ACID TOWER LININGS
ACCUMULATOR LININGS
DIGESTER LININGS
MACHINE ROOM WHITE TILE

Stebbins Engineering & Mfg. Co.

WATERTOWN, N. Y.

MONTREAL SEATTLE

Weyerhaeuser Selects Monel Metal for SAVE-ALL TRAYS



156" sulphite pulp-drying machine installed at the new Everett, Washington, Pulp Division of the Weyerhaeuser Timber Co. The Monel Metal save-all trays were fabricated by welding and riveting by RICE, BARTON & FALES, INC., *Worcester, Mass.*

Monel Metal was chosen because it combines strength, rigidity, and corrosion resistance

HERE'S a sulphite pulp dryer, designed to turn out 150 tons a day, for the newest pulp mill on the West Coast.

Weyerhaeuser had this dryer specially built . . . and used the most expert engineering advice to get the best metals for each part. And WHY do you find Monel Metal in the save-all trays?

Because any trays as long as these must have great strength and stiffness. *And Monel Metal is stronger than structural steel.*

Because to *keep* their strength, trays must resist the corrosion of white water from unbleached sulphite pulp. *Monel Metal's resistance to such conditions has been proved by years of service.*

Because the best way to make these trays serviceable is to fabricate them by welding and riveting. *And because welds of Monel Metal have the same resistance to corrosion as the base metal. And that without needing any heat treatment.*

Incidentally, because Monel Metal's solid, non-rusting surface stays SMOOTH. This means less accumulation of stock, slime, filler. You count the difference in hours saved at clean-up time.

Smart paper men find every week new places to take advantage of these virtues of Monel Metal. Look at the list appended where Monel Metal is now in common use. Write Inco's engineers; you'll find their experience of value when you plan replacements.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.

SOME OTHER USES OF MONEL METAL IN THE PAPER MILL

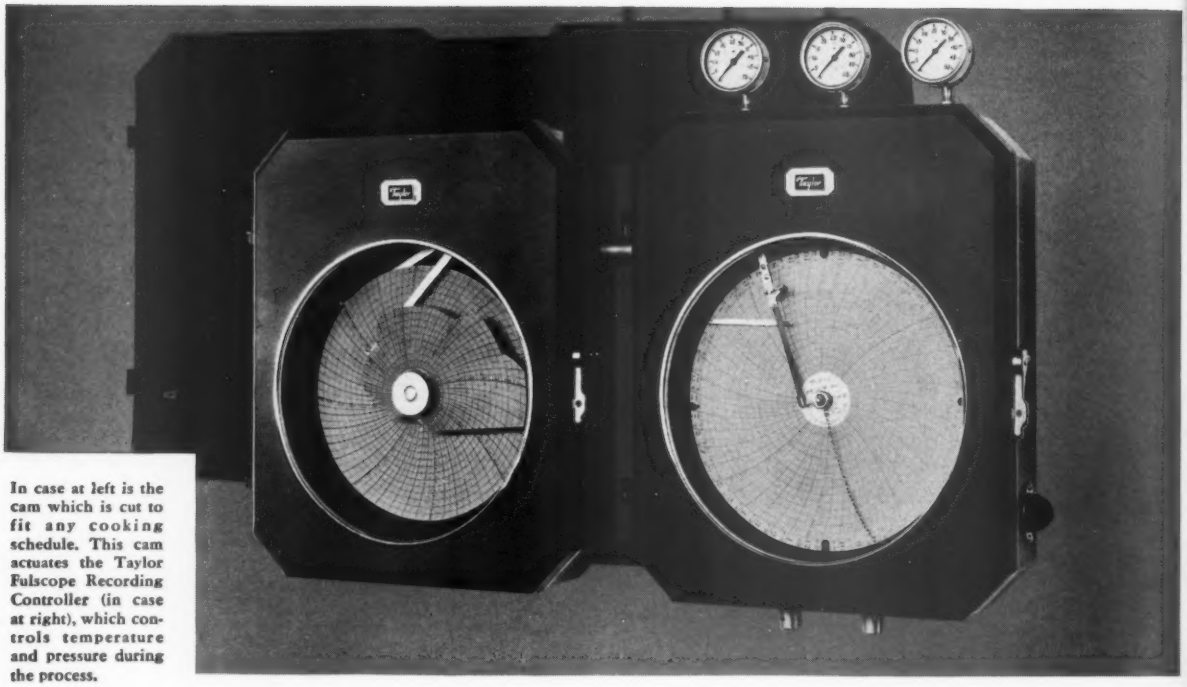
- Black Liquor and Caustic Soda Evaporator Tubes
- Beater Bars
- Jordan Engine Fillings
- Cylinder and Drum Winding Backing Wire Cloth and Facing Cloth
- Cylinder Mold Stay Rods ($\frac{5}{16}$")
- Couch Roll Stay Rods
- Suction Box Stay Rods
- Suction Boxes and Tops
- Suction Box Trays
- Table Rolls
- Doctor Blades
- Pump Rods and Shafts
- Valves and Fittings
- Alum and Size Systems
- Coating and Coloring Preparation

MONEL METAL

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL

Easy to keep cooking schedules *on the dot*



In case at left is the cam which is cut to fit any cooking schedule. This cam actuates the Taylor Fulscope Recording Controller (in case at right), which controls temperature and pressure during the process.

Sulphite Digester temperatures and pressures regulated automatically in modern mills by Taylor Digester Control System

BY INSTALLING automatic control of the cooking cycle, many mills have taken a long step forward in modernizing their processes and in cutting conversion costs. More than that, they have found a way to assure a maximum output of No. 1 stock.

The Taylor System of Sulphite Digester Control makes it absolutely certain that the ideal cooking cycle for a particular grade of stock will be followed every time. Its control and coordination of temperature and pressure is exact—sure. In design and construction, this system contains everything needed to increase operating efficiency and economy. Even variations in gas pressures are compensated for automatically in the steam flow control.

The Taylor System of Sulphite Digester Control gives the greatest possible production of highest quality stock. It assures uniformity in color, freeness and strength. It gives a stock that felts well, forms well and dries well. It reduces "tailing" losses. Stock attains a uniform quality that saves chemicals during bleaching.

With this Taylor System you cut losses due to failure of digesters to blow cleanly. And you can space cooking cycles to economize on steam.

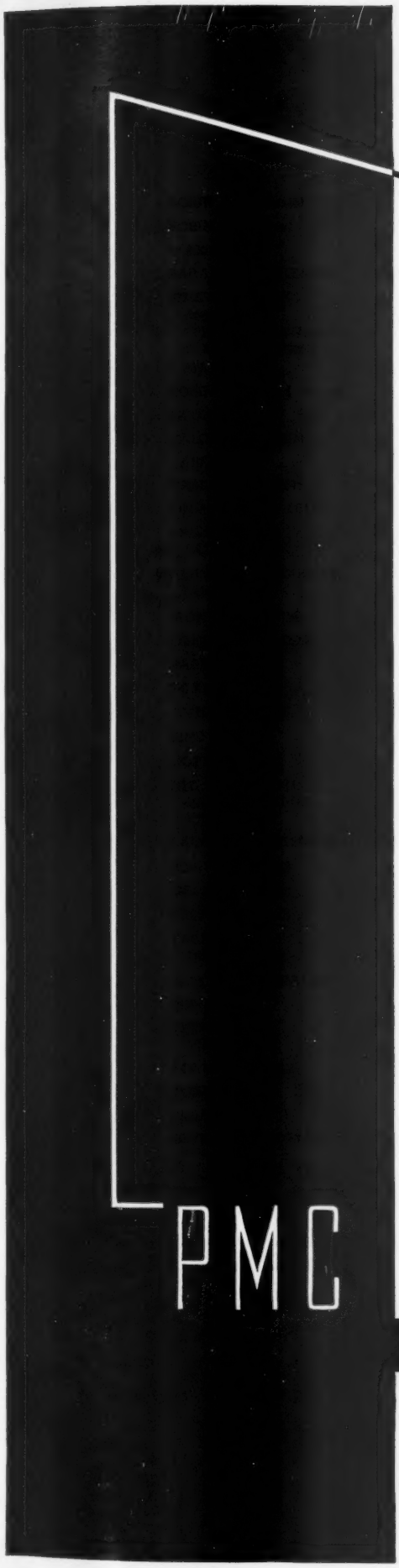
The ease with which Taylor Control regulates the two costly variables in the sulphite process has been proved in many mills. Ask the Taylor Representative about this system—and also the other Taylor Control Systems designed especially for modern paper mills. Or write Taylor Instrument Companies, Rochester, N.Y. Plant also in Toronto, Canada. Manufacturers in Great Britain, Short & Mason, Ltd., London, England.

Pacific Coast Sales Offices — Aronson Bldg., San Francisco, Cal., and Central Bldg., Los Angeles. Also, Terminal Sales Bldg., Portland, Oregon.

Taylor

Indicating Recording • Controlling

TEMPERATURE, PRESSURE *and* **FLOW INSTRUMENTS**



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PMC
CHEMICALS

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PM-38

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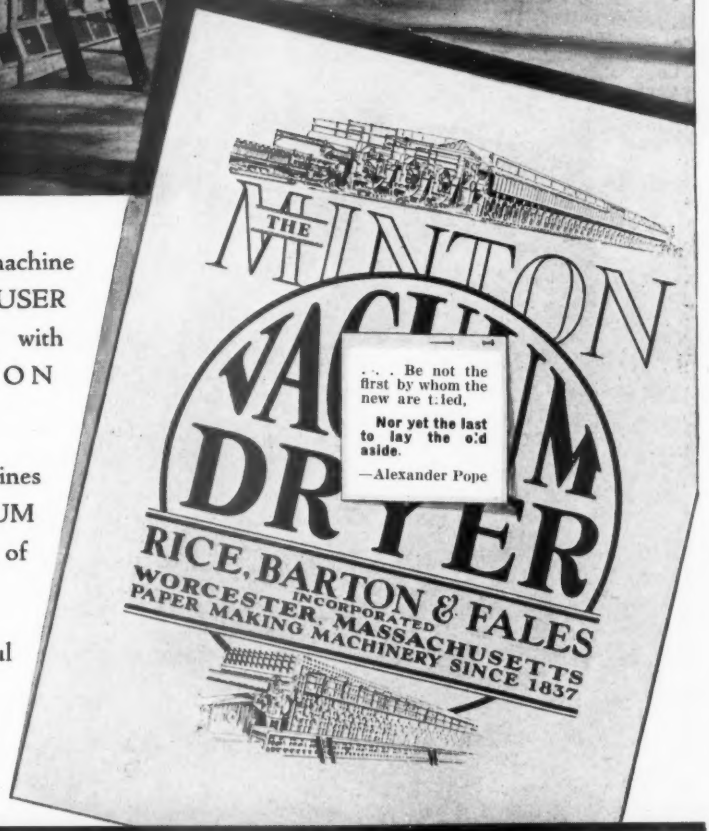
SULPHUR

The "RICE-BARTON" pulp drying machine at the Everett Mill of the WEYERHAEUSER TIMBER COMPANY is equipped with Fourdrinier wet end and MINTON VACUUM DRYER.

Our company has built ALL of the machines equipped with the MINTON VACUUM DRYER in this country for the drying of sulphite pulp.

Consult us about modern and successful Pulp Drying Machines.

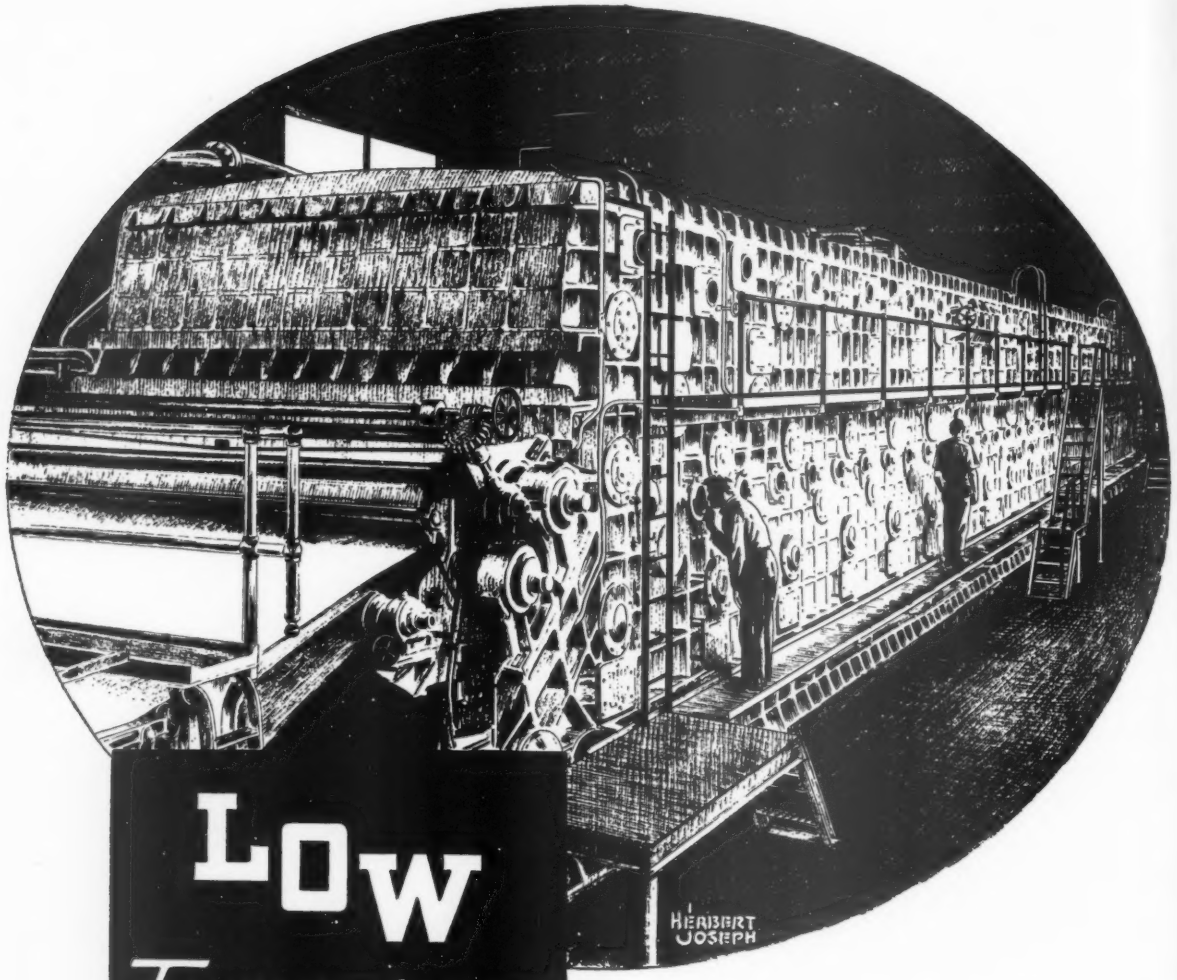


RICE, BARTON & FALES

Incorporated

WORCESTER, MASSACHUSETTS

Paper Making Machinery Since 1837



LOW *Temperatures*

VACUUM DRIERS like that pictured above remove moisture from all Weyerhaeuser pulp at a lower temperature than would be necessary at atmospheric pressure.

EXCESSIVE HEAT is destructive to cellulose • • For this reason careful regulation of temperature is part of the intensive control exercised throughout the manufacture of Weyerhaeuser sulphite • • During cooking, bleaching and vacuum-drying processes, low temperatures are maintained • • This protects the cellulose and helps materially to preserve the high qualities of the pulp.

PULP DIVISION • WEYERHAEUSER TIMBER COMPANY

LONGVIEW WASHINGTON

Mills at Longview and Everett, Washington

WEYERHAEUSER
SULPHITE
BLEACHED UNBLEACHED

PACIFIC PULP and PAPER INDUSTRY

The Journal of the Pacific Coast Industry

JULY, 1936

Annual Review and Statistical Number

Vol. X - - - - No. 7

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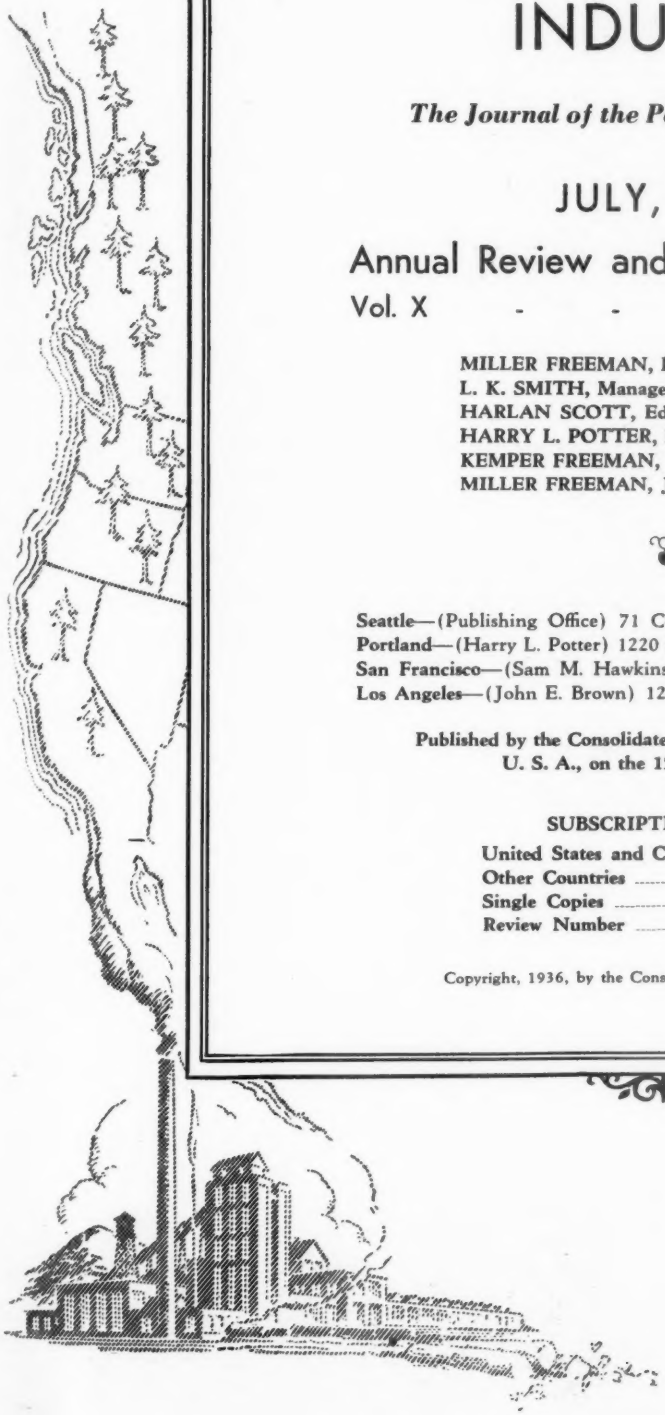


violets

FOR CALENDER COLORING AND DIPPING

Here are five Du Pont Acid Violets that are particularly well suited to the dipping of tissues and for calender coloring.

PONTACYL* Violet C4B

A readily soluble product yielding brilliant shades of violet.

PONTACYL* Violet S4B

This dye possesses the same characteristics as the C4B type, but is redder in shade.

The above types are also recommended for producing bright whites in cheap book and catalog papers without danger of obtaining granite effects on mixed furnishes.

PONTACYL* Violet RL

This dye is the fastest of the surface staining violets and is extremely fast to light. It is also very soluble.

PONTACYL* Violet 6R

A soluble, reddish shade of violet which is very fast to light.

PONTACYL* Fast Violet 10B

A readily soluble, bright greenish shade of violet.

*Reg. U. S. Pat. Off.

DU PONT DYESTUFFS
REG. U.S. PAT. OFF.

E. I. DU PONT DE NEMOURS & CO., INC.
ORGANIC CHEMICALS DEPT., DYESTUFFS DIVISION
WILMINGTON, DELAWARE

PACIFIC COAST PULP PRODUCTION INCREASED 10% IN 1935

Record Production—Sulphite Tonnage Led All Other Regions—Review of Industry Highlights for 1935 and First Half of 1936

BREAKING the 1934 record production of 919,533 tons of pulp, all grades, the Pacific Coast region established a new high total in 1935 with 1,011,421 tons of pulp, all grades except soda. This tonnage was produced in Oregon and Washington.

The Pacific Coast production of sulphite pulp led all other regions with 560,726 tons, and likewise the tonnages of bleached sulphite and unbleached sulphite pulp were greater than those produced in any of the other pulp making regions of the United States.

Bleached sulphite production on the Pacific Coast totalled 313,203 tons, and unbleached sulphite totalled 247,523 tons.

Sulphate production on the Pacific Coast also expanded to a new record with 194,740 tons, of which 27,324 was bleached sulphate. This is the first year of which a record has been kept of bleached sulphate pulp production.

The increase during 1935 over 1934 in the Pacific Coast production of pulp of all grades, except soda, was 91,888 tons or approximately 10 per cent. The 1935 increase in sulphite pulp tonnage amounted to 45,989 tons or approximately 9 per cent over 1934. The 1935 bleached sulphite production increased 27,269 tons over 1934 or approximately 9 per cent. Unbleached sulphite production increased 18,720 tons in 1935 or 8 per cent.

Largest Increase in Kraft

The total sulphate pulp production in 1935 was 28,993 tons larger than in 1934, or approximately 17 per cent greater.

Ground wood production increased 7 per cent in 1935 over 1934 with additional production of 16,906 tons.

Regional Comparisons

In total pulp produced the Pacific Coast was second to the South, the South producing 1,139,162 tons or 127,741 tons more. Of the Southern total 1,051,620 tons was sulphate pulp, leaving but 87,542 tons of all other grades. Sulphate pulp in 1935 amounted to 92 per cent of all pulp production in the South, the same percentage as in 1934.

Coast Production Continues to Expand

In thirteen years the production of pulp on the Pacific Coast has expanded from 299,596 tons to 1,011,421 tons, an increase of 711,825 tons or 237 per cent.

The foregoing data are from the official report for 1935 of the United States Pulp Producers Association.

Following is the United States Pacific Coast wood pulp production by years from 1923 to 1935 inclusive:

U. S. Pacific Coast Wood Pulp Production, 1923-1935

	Tons of 2,000 lbs.
1923	299,596
1924	309,433
1925	322,594
1926	378,005
1927	449,218
1928	562,514
1929	780,494
1930	815,089
1931	817,548
1932	607,662
1933	773,102
1934	935,033
1935	1,011,421

United States Pulp Production in 1935

Production of wood pulp in the United States in 1935 topped all previous records with a total of 4,894,824 tons. This was 32,000 tons greater than the 1929 production, which held the previous record.

Sulphate pulp production was the contributor to the new record with a total of 1,415,096 tons, 152,000 tons greater than the previous high in 1933.

Bleached sulphite with a total of 919,961 tons also reached a new high record, exceeding the best previous year, 1929, by 80,000 tons.

The 608,442 tons production of unbleached sulphite pulp in 1935, while approximately 9,000 tons greater than in 1934, was 303,287 tons below the peak year of 1926, when 911,729 tons were produced.

Unbleached Sulphite on Upgrade

From the peak production in 1926 unbleached sulphite pulp manufacture dropped to a low of 543,957 tons in 1933. In 1934 production was 599,905 tons. The recovery of this branch of the pulp industry since 1933 and up to the end of 1935, amounts to 64,485 tons yearly.

Groundwood Production Declining

Production of groundwood pulp in the United States amounted to 1,140,313 tons in 1935. This is the smallest groundwood production on record since 1904, when according to the U. S. Department of Commerce 968,976 tons of groundwood pulp were produced. The next year of record, 1909, groundwood amounted to 1,179,266 tons. So the 1935 production was less than that of 1909 by 39,000 tons.

Groundwood production declined steadily from a peak of 1,774,192 tons in 1926 to 1,197,553 tons in 1933. Production in 1934 rose to 1,253,398 tons or an increase of 56,000 tons over 1933, only to hit a new low in 1935.

UNITED STATES WOOD PULP PRODUCTION BY REGIONS[1]—1935

Source—United States Pulp Producers Association
(Tons of 2000 Pounds)

Region.	Total All Grades*	Total Sulphite	Bleached Sulphite	Unbleached Sulphite	Total Sulphate	Bleached Sulphate	Unbleached Sulphate	Groundwood
West Coast	1,011,421	560,726	313,203	247,523	194,740	27,324	167,416	255,955
New England	905,390*	374,339	219,369	154,970	-----	-----	-----	531,051
New York & Pennsylvania	448,079	210,011	120,215	89,796	-----	-----	-----	238,068
Lake States	879,058*	371,474	218,381	153,093	251,513*	44,711	206,802*	256,071
South	1,139,162	66,966	60,369	6,597	1,051,620	96,673	954,947	20,576
Totals	4,383,160	1,583,516	931,537	651,979	1,497,873	168,708	1,329,165	1,301,721

*Production of Unbleached Sulphate in New England included in Lake States to avoid disclosing individual mill's figures.
[1] Except Soda Pulp. About 15,000 tons of Soda Pulp was produced on the Pacific Coast in 1935.—(Editor).
Total United States production of all grades of Wood Pulp except Soda, Miscellaneous and Off-Quality Pulp, estimated on the basis of monthly reports to the United States Pulp Producers Association by mills representing 94% of the industry's total capacity.

This decline in groundwood production is due to the unprofitable production of news print in the United States, which is also declining steadily year by year.

Soda pulp production in 1935 was 473,068 tons, an increase of 179,000 tons over 1934, but 47,000 tons under the peak year of 1929.

U. S. Pulp Imports

Imports of wood pulp established a new high record in 1935 with 1,993,643 short tons, of which 1,743,602 tons was chemical pulp, and 190,041 tons groundwood.

The total value was $70,760,951, an increase of $8,910,682 over the 1934 value of $61,850,269.

Imports in 1934 were 1,806,128 short tons of all classes of wood pulp. The increase in tonnage in 1935 over 1934 was 127,515 short tons.

The gain in tonnage in 1935 was 7 per cent while the increase in value was 14.4 per cent.

The previous import record was 1933 with 1,733,744 long tons of all grades valued at $57,398,920. Imports in 1935, while having a value greater than in any year since 1930, were under the yearly value of the pulp imports for the eight consecutive years prior to and including 1930.

In 1926 pulp imports registered their greatest value with $91,487,071. Imports in 1935 were $20,726,120, or 22.6 per cent under the 1926 value.

Chemical Pulp Imports

Imports of chemical pulp in 1935 totalled 1,743,602 short tons valued at $67,483,566, an increase of 126,848 tons, or 7.8 per cent in quantity, over the 1,616,754 short tons valued at $58,605,219 imported in 1934.

Imports have for six years, not all consecutive, exceeded a million and a half tons, in 1928, 1929, 1930, 1933, 1934 and 1935. Imports in 1931 and in 1932 did not reach the million and a half ton mark.

Mechanical Pulp Imports

Imports of groundwood pulp in 1935 rose slightly over 1934 with a tonnage of 190,041 short tons, valued at $3,277,385, compared with 189,374 short tons, valued at $3,245,050 in 1934.

The peak of groundwood imports was reached in 1925 with 333,092 short tons. For the past five years imports have run below the 200,000 ton mark. From 1930 back for nine years imports of groundwood were above this mark and for several years were close to the 300,000 ton figure.

With the exception of 1932 and 1934 the imports of groundwood in 1935 were the smallest of any year in the previous fourteen in tonnage, but the value in 1935 was larger than that of the imports in the past four years.

Unbleached Kraft Imports

Imports of unbleached sulphate pulp in 1935 went up over 9 per cent above 1934 with 526,684 short tons valued at $15,893,593. The tonnage increase over 1934 was 45,249 tons. The 1935 increase in value was $2,159,817.

A new record for unbleached kraft pulp imports was established in 1935 with a total approximately 10,000 tons above 1933, the previous high import record.

Bleached Kraft Imports Rise Rapidly

Bleached sulphate pulp imports showed a remarkable gain in 1935 with 84,658 short tons over 54,068 short tons in 1934, an increase of 56 per cent. The 1934 value was $3,334,713 while the 1935 value was $5,193,789.

Soda Pulp Imports Also Increase

Imports of soda pulp in 1935 totalled 9,416 short tons valued at 40,636 as compared with 7,464 short tons valued at $304,660 in 1934.

British Columbia Pulp Production Declines

British Columbia wood pulp production in 1935 declined 22,018 short tons to 361,800 tons from the high of 383,818 tons produced in 1934.

The curtailment of production was due to the tariff war between Japan and Canada, which entirely eliminated exports of pulp from British Columbia to Japan from the latter part of July, 1935, until the end of the year, when the problem was solved by mutual concessions.

British Columbia producers of both pulp and paper were forced, upon Japan's applying a 50 per cent duty to their products, to seek immediate markets elsewhere. Japan is a far more important market for British Columbia pulp than it is for paper, hence paper production did not show the decline exhibited by British Columbia pulp. In fact, paper production showed a slight increase for the year of 1,227 tons. Newsprint production declined 5,283 tons during the year as compared with the 1934 production of 267,406 tons. The 1935 newsprint tonnage was 262,123.

However, the production of papers other than newsprint expanded to 33,287 tons or 6,510 tons more than in 1934. The value of pulp and paper products produced in British Columbia during 1935 was $12,414,000 compared with $12,373,000 in 1934, an increase of $41,000 in value.

Following is the British Columbia wood pulp production by years from 1923 to and including 1935:

British Columbia Wood Pulp Production, 1923-1935

	Tons of 2,000 lbs.
1923	217,076
1924	216,243
1925	230,733
1926	259,504
1927	296,253
1928	310,961
1929	304,619
1930	335,429
1931	310,029
1932	259,586
1933	343,897
1934	383,818
1935	361,800

U. S. Pulp Exports Expand

While the increase in the exports of pulp from the United States in 1935 reached some 20 per cent over 1934, the total still remains insignificant when compared with pulp imports.

Exports of all grades of pulp in 1935 totalled 153,313 long tons valued at $8,632,971. Exports in 1934 totalled 127,617 long tons, valued at $7,005,559. The increase in quantity was 25,696 tons, and in value, $1,627,412. About a third of the tonnage and about 40 per cent of the value is attributable to the exportation of rayon pulp from the Pacific Coast to Japan.

The U. S. Department of Commerce figures for 1935 show that in 1935 exports of sulphite pulp totalled 148,586 long tons, valued at $8,347,968, while in 1934 the exports of sulphite pulp amounted to 124,348 long tons valued at $6,815,640. Soda pulp exports last year totalled 1,899 long tons, valued at $104,932, compared with 1,196 long tons, valued at $69,228 in 1934. Shipments of miscellaneous pulp amounted to 2,828 long tons, valued at $180,071, compared with 2,073 long tons, valued at $120,691 in 1934.

It will be noticed that 97 per cent of the total pulp exported was sulphite pulp. Almost all of the sulphite was exported from the Pacific Coast.

PACIFIC COAST WOOD PULP PRODUCTION—1923-1935

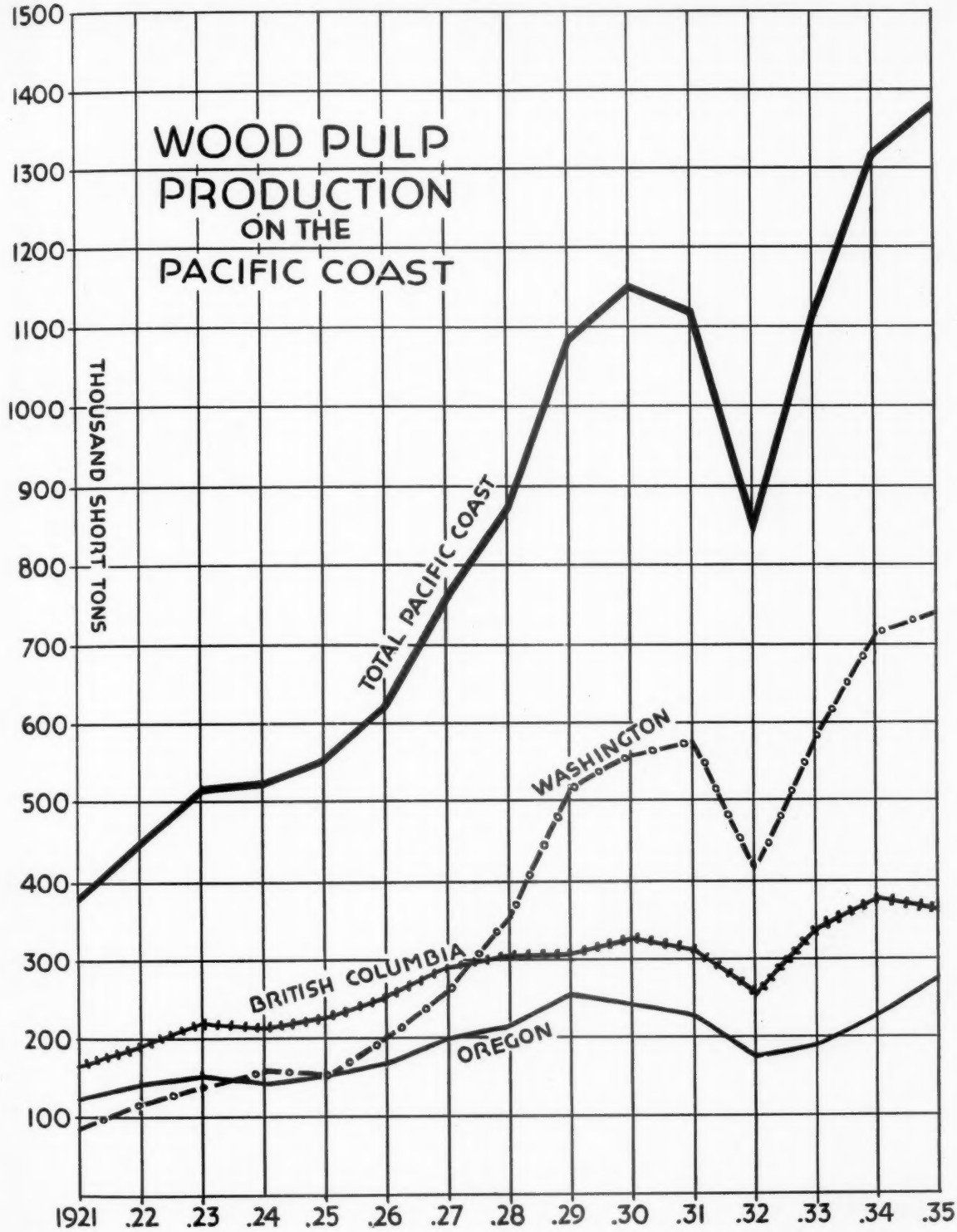
Pacific Coast States and British Columbia
(Tons of 2,000 lbs.)

	1923 Tons	1924 Tons	1925 Tons	1926 Tons	1927 Tons	1928 Tons
Washington	136,943	159,539	161,858	199,164	268,349	349,107
Oregon and California	162,653	149,894	160,736	178,841	200,869	213,407
British Columbia	217,076	216,243	230,733	259,504	296,253	310,961
Total Pacific Coast	**516,672**	**525,676**	**553,327**	**637,509**	**775,471**	**873,475**

	1929 Tons	1930 Tons	1931 Tons	1932 Tons	1933 Tons	1934 Tons	1935‡ Tons
Washington	523,948	566,137	580,016	420,529	583,770	709,748	743,223
Oregon and California	256,546	248,952	237,532	187,133	189,332	225,285	283,198
British Columbia	304,619	335,429	310,029	259,586	343,897	383,818	361,800
Total Pacific Coast	**1,085,113**	**1,150,518**	**1,127,577**	**867,248**	**1,117,999**	**1,318,851**	**1,388,221**

Source—U. S. figures up to and including 1933, from U. S. Dept. of Commerce, Bureau of Census; B. C. figures from Dept. of Lands, Forest Branch; and Dominion Bureau of Statistics.

‡ Figures based upon United States Pulp Producers Association total for Oregon and Washington, excepting soda pulp. Addition of soda pulp production and division of products between Oregon and Washington estimated by Pacific Pulp & Paper Industry. No wood pulp production in California.



A comparison at this point between pulp imports and pulp exports is both interesting and enlightening.

Imports of pulp in 1935 amounted to 1,933,643 short tons valued at $70,760,951. Exports in 1935 amounted to 153,313 long tons valued at $8,632,971.

Following is a table of the exports of wood pulp from the United States for the past six years with values:

	Long Tons	Value
1930	43,238	$2,070,553
1931	47,596	2,405,642
1932	42,733	2,037,553
1933	70,707	3,113,883
1934	127,617	7,005,559
1935	153,313	8,632,971

U. S. Pulp Consumption

The consumption of wood pulp in the United States during 1935 attained a total of 6,659,811 short tons, 36,511 tons short of the year of the largest pulp consumption, 1929. However, 1935 consumption was second only to 1929.

Consumption is considered to be domestic production plus imports minus exports.

Consumption of unbleached sulphite pulp was 1,256,161 tons, an increase of 39,064 tons over 1934, but 356,298 tons short of the 1,612,459 tons consumption in 1929.

The consumption of bleached sulphite pulp in the United States established a new record with 1,257,463 tons, an increase of 108,572 tons over the 1934 consumption.

Kraft Experiences Remarkable Increase

Sulphate pulp consumption also established a record with 2,026,438 tons, an increase of 249,967 tons over 1934. The 1935 consumption passed the two million ton mark for the first time, and is largely accounted for by the tremendous increase in the use of fibre shipping cases.

In 1925 the consumption of sulphate pulp in the United States was 772,079 tons. In ten years consumption has increased 1,254,359 tons or 162 per cent.

Groundwood pulp consumption, due to the shifting of newsprint manufacture to Canada, has declined from a high of 2,068,007 in 1926 to a new low in 1935 of 1,330,354 tons.

Soda pulp consumption in 1935 was 480,585 tons, an increase of 179,033 tons over 1934, but 38,000 tons below the 1929 top of 518,533 tons.

Paper Production and Consumption

The production of paper in the United States during 1935 was 10,307,000 tons according to the American Paper & Pulp Association's estimate. It was divided as follows: News print, 939,000 tons; Book papers, 1,194,000 tons; Paperboard, 4,693,000 tons; Wrapping, 1,570,000 tons; Writing, 480,500 tons; Cover papers, 20,500 tons; Tissues, 425,000 tons; Absorbent papers, 85,000 tons; Building papers, 426,000 tons; All others, 474,000 tons.

The 1935 paper production was 1,120,000 tons larger than the 1934 production of 9,186,226 tons, or an increase of 12 per cent. The 1933 production was almost identical with that in 1934, being 9,190,017 tons.

The consumption of paper in the United States (production plus imports, minus exports) was estimated to be 12,490,886 tons. The difference between the production and consumption figures being very largely imports of news print.

Pacific Coast Imports of Pulp

Paper mills on the Pacific Coast during 1935 imported 37,032 short tons of pulp valued at $1,191,360. Unbleached sulphite pulp imported amounted to 14,633 tons valued at $427,366. Bleached sulphite imports totalled 9,439 tons valued at $403,981.

Unbleached sulphate pulp imported reached 10,979 tons of a declared value of $320,478. Bleached sulphate imports were 110 tons valued at $6,157.

Groundwood pulp imports, unbleached, were but 235 tons valued at $3,781, while bleached groundwood imports totalled 1,636 tons valued at $28,617.

Los Angeles Led in Pulp Imports

The Los Angeles customs district led the other three Pacific Coast customs districts with pulp imports in 1935 of 16,625 tons. Oregon was second with imports of 7,623 tons, Washington third with 7,130 tons and San Francisco fourth with imports of 5,654 tons.

Pacific Coast Paper Imports

The customs records, according to the U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, show that the Pacific Coast, including Alaska, imported 150,691 tons of newsprint valued at $4,817,856 in 1935.

By customs districts these newsprint imports were as follows: San Diego, 4,876 tons valued at $148,470; Los Angeles, 40,226 tons of a value of $1,252,256; San Francisco, 48,735 tons valued at $1,505,825; Washington customs district,

THE COVER PHOTOGRAPH

was taken on the docks of the Soundview Pulp Company in Everett, Washington, and shows Soundview Bleached Sulphite Pulp being loaded into the hold of the Walter Luckenbach, large inter-coastal freighter, for shipment to the Atlantic seaboard market.

TOTAL UNITED STATES PRODUCTION OF WOODPULP

By Grades—1925-1935*

(Tons of 2000 pounds)

Year.	Total	Unbleached Sulphite	Bleached Sulphite	Total Sulphate	Groundwood	Soda	All Other
1925	3,962,217	790,510	612,576	409,768	1,612,019	472,647	64,697
1926	4,394,766	911,729	646,466	519,960	1,764,248	496,920	55,463
1927	4,313,403	872,411	680,288	603,253	1,610,409	487,478	59,564
1928	4,510,800	836,751	722,107	774,225	1,610,988	488,641	78,088
1929	4,862,885	848,754	839,953	910,888	1,637,653	520,729	104,908
1930	4,630,308	815,897	751,166	949,513	1,560,221	474,230	79,281
1931	4,409,344	675,859	740,812	1,034,291	1,449,240	374,054	135,088
1932	3,760,267	548,702	596,937	1,028,846	1,203,044	290,703	92,035
1933	4,329,248	543,957	742,662	1,263,222	1,197,553	581,854	
1934	4,281,428	599,905	806,612	1,240,967	1,253,398	294,089	86,457
1935	4,894,824	608,442	919,961	1,415,096	1,140,313	473,068	82,912

*Source: 1925-1933 U. S. Bureau of the Census. 1934 and 1935 data from United States Pulp Producers Association.

ESTIMATED UNITED STATES CONSUMPTION OF WOODPULP

By Grades—1925-1935*

(Tons of 2000 pounds)

Year.	Total	Unbleached Sulphite	Bleached Sulphite	Total Sulphate	Groundwood	Soda	All Other
1925	5,590,214	1,426,610	921,291	772,079	1,943,111	469,897	57,226
1926	6,095,279	1,603,433	964,952	913,024	2,068,007	495,127	50,736
1927	5,960,915	1,546,349	1,015,172	997,438	1,856,008	485,208	60,740
1928	6,239,814	1,541,817	1,054,512	1,217,573	1,860,187	485,907	79,818
1929	6,696,322	1,612,459	1,192,370	1,358,181	1,911,114	518,533	103,665
1930	6,414,760	1,543,265	1,095,312	1,371,847	1,859,453	474,369	70,514
1931	5,952,741	1,255,770	1,074,334	1,453,501	1,659,804	376,040	133,292
1932	5,194,367	1,094,831	922,381	1,402,954	1,391,509	291,224	91,468
1933	6,189,602	1,225,537	1,153,778	1,821,656	1,407,832	580,799	
1934	5,969,633	1,217,097	1,148,891	1,776,471	1,442,772	301,552	82,850
1935	6,659,811	1,256,161	1,257,463	2,026,438	1,330,354	480,585	80,475

*Consumption: Production plus imports minus exports.

56,833 tons valued at $1,910,554; Alaska, 21 tons valued at $751.

Not all of these newsprint imports were consumed in the areas adjacent to the ports of entry. A large proportion, particularly in Washington, were entered for shipment by rail into the inter-mountain territory.

Pacific Coast Imports of Other Papers

Imports of grease-proof and waterproof papers during 1935 into the Los Angeles customs district total 3 tons valued at $501. San Francisco imports of the same grades amounted to 3.5 tons valued at $2,397.

Imports of kraft wrapping papers into Los Angeles totalled 272 tons in 1935 valued at $13,598. San Francisco recorded 38 tons of a value of $2,071.

Other wrapping paper imports accounted for 10 tons valued at $588 through the port of Los Angeles; two-tenths of a ton valued at $54 through San Francisco; and, 126 pounds valued at $95 in Washington.

The total imports of paper on the Pacific Coast in 1935, all grades, was 151,018 short tons valued at $4,837,160.

The Pulp Market

After maintaining a fairly steady price level through 1934 and the first two months and a half of 1935, the pulp market prices went down on March 19, 1935, when foreign producers cut the price of bleached sulphite delivered on the Atlantic Coast $5 per ton and the price of unbleached sulphite pulp $4 per ton. This was a serious blow to American producers in all sections of the country, but particularly hard on those in New England and the Lake States where raw material costs and other production costs are higher than on the Pacific Coast.

The price reduction made the pulp market unattractive from a profit viewpoint. Pacific Coast mills, although having the advantage of cheaper wood costs and more modern mills than their Eastern competitors, were at a serious disadvantage as to labor costs, which were as much as 18 per cent higher than the labor costs of pulp mills in other regions of the United States.

But, by expending large sums of money in improvements in wood handling, in cooking methods, and in other parts of the process, excellent management brought costs down to where most Pacific Coast pulp mills were slightly on the black side of the ledger when 1935 closed.

The results achieved in the nine months from the price cut in March up to the end of the year, were a tribute to the efficiency of both management and employees.

Undertone Strengthened

The undertone of the pulp market gradually strengthened during 1935 as demand became larger. There was no question but what actual consumption of pulp was increasing as 1935 moved along, for paper and paperboard production clearly show increased use of pulp, but as the year ended and the buying kept increasing in the early part of 1936, some began to tend toward the belief that all of the buying was not sound, that considerable wood pulp was being converted temporarily into nitrocellulose for war munitions (the Italian-Ethiopian war), and that fear of inflation was causing many buyers to enter orders far beyond their needs.

But, as this is written (middle June, 1936) these fears have not materialized, the markets are even stronger than at the start of the year, the unbleached sulphite pulp market in particular. Buying slowed down toward the middle of 1936, but the markets did not weaken, for the mid-year slowing down is a normal condition.

No Effect From NRA

The outlawing of the NRA by the Supreme Court at the end of May, 1935, did not effect the pulp market either way. It continued its even tenor and it became a sellers market. To the credit of the American pulp producing industry it must be said that in this sellers market they protected the American buyers early in the fall of 1935 by successfully resisting an increase in the price of bleached sulphite, which they felt was unwarranted, although demand was overtaking the available supply.

Foreign pulp producers, having reversed their position of March, 1935, desired to raise the price of bleached sulphite in view of the heavy demand. They were under pressure from the money exchange, the pound sterling having risen to around $5.00, and their net income was consequently reduced.

Demand continued to grow in the latter part of 1935 for all grades of pulp except unbleached sulphite which lagged behind until March of 1936, when it began to develop strength. At the present writing the unbleached market is strong and pulp is scarce, the small available amounts for spot delivery bringing premiums.

Kraft pulp constantly steadied throughout 1935 ending the year in a far stronger position both as to quantity sold and as to price than at the beginning of 1935. The range in kraft pulp prices

SUMMARY FOR 1935 OF UNITED STATES WOOD PULP PRODUCTION, SHIPMENTS and STOCKS*

Tons of 2,000 lbs., air dry weight

			Shipments		Stocks on Hand End of Period	
	Production	Used	Domestic Market	Export	Own Use	Market
Total All Grades (Except Soda) 1935[1]	4,166,724	3,611,028	422,814	157,228	58,799	28,842
Total[2] Sulphite	1,528,403	995,468	392,371	157,228	16,935	28,380
Total[3] Bleached Sulphite	919,961	529,928	309,680	91,921	5,933	24,389
Total[4] Unbleached Sulphite	608,442	465,540	82,691	65,307	11,002	3,991
Total[5] Bleached Sulphate	146,246	144,716	1,563	-----	905	-----
Total[6] Unbleached Sulphate	1,268,850	1,263,227	6,644	-----	5,045	-----
Total[7] Groundwood	1,140,313	1,126,709	20,206	-----	35,311	382
Total[8] Damaged, Off-Quality and Miscellaneous Grades	82,912	80,908	2,030	-----	603	80

*Source—United States Pulp Production Association.
[1] 172 mills whose capacity totals 94% of capacity of the United States.
[2] As reported by 74 sulphite mills whose capacity totals 90% of the sulphite capacity of the United States.
[3] As reported by 45 bleached sulphite pulp mills whose capacity totals 100% of the bleached sulphite capacity of the U. S.
[4] As reported by 62 unbleached sulphite mills whose capacity totals 98% of the unbleached sulphite capacity of the U. S.
[5] As reported by 11 mills, representing all mills producing bleached sulphate.
[6] As reported by 34 mills whose capacity totals 94% of sulphate capacity of the U. S.
[7] As reported by 99 mills whose capacity totals 92% of groundwood capacity of the U. S.
[8] As reported by 8 mills.

REGIONAL PERCENTAGES OF UNITED STATES WOOD PULP PRODUCTION

Total and by Grades in 1934 and 1935[1]

Region.	Sulphite 1934	Sulphite 1935	Sulphate 1934	Sulphate 1935	Groundwood 1934	Groundwood 1935	Total 1934	Total 1935
New England	23%	24%	0%	*	42%	41%	22%	21%*
New York and Pennsylvania	12%	13%	0%	0%	18%	18%	10%	10%
Lake States	25%	23%	13%	17%*	20%	19½%	20%	20%*
South	4%	4%	73½%	70%	1%	2%	25%	26%
West Coast	36%	36%	13½%	13%	19%	19½%	23%	23%

[1] Does not include soda pulp miscellaneous grades and off-quality pulp.
*Production of unbleached sulphate in New England included in Lake States to avoid disclosing the individual mill's figures.
Source: Based on monthly reports to the United States Pulp Producers Association by mills representing 94% of the industry's total capacity.

the year 1935 was $3 per ton, the high at the close of the year being $36 per ton dock Atlantic ports. The price increased during the first half of 1936 due to increased demand and a scarcity of a floating supply, to a $38 to $40 basis for the best quality.

Bleached sulphite opened 1935 at $55 per short ton for the best quality ex dock Atlantic ports, but was cut by foreign producers in March to a basis of $50 per ton. Special grades ranged upward to $52 and even $55. By mid-year 1936 foreign quality bleached sulphite was quoted in the New York market at from $53 to $55, while foreign bleached sulphite, extra prime quality was quoted at from $55 to $65. Domestic bleached sulphite, No. 1 bond quality was quoted at $55 to $60. Domestic bleached sulphite, No. 1 book quality was quoted at from $52 to $55 per ton. There was evidence that a further strengthening of the price was due in July when the quarterly adjustment on domestic contracts was to be made.

In June, 1936, foreign easy bleaching prime quality sulphite pulp was quoted ex dock Atlantic ports at from $41 to $43, while Mitscherlich unbleached or ordinary quality was quoted at from $38 to $41 per ton. Inferior and semi-prime grades of foreign unbleached were bringing from $36 to $38 at Altantic ports.

Domestic unbleached sulphite, No. 1 book quality was quoted at from $40 to $42 ex dock Atlantic ports, and domestic unbleached No. 1 strong was quoted at from $37 to $40 per ton.

Groundwood prices during 1935 ranged from a low of $15 for prime Canadian, f. o. b. pulp mills to a high of $20 per ton. Prime foreign dry groundwood sold ex dock Atlantic ports from $19.50 to $22.

The Paper Market

Despite increased consumption of paper in 1935 prices remained low, too low, for profitable operation of many American mills in view of their added costs of labor and raw materials.

The efforts to raise the newsprint price in 1935 failed due to the unsettled Canadian situation. The newsprint industry was working toward a 1936 price of either $42.50 per ton or $43 when the Great Northern Paper Company of Maine announced its 1936 price as $41 thereby setting the 1936 price. Demand for newsprint continued to expand and the industry is hopeful of a further increase in 1937 which will place a majority of the newsprint mills in a barely profitable position. United States production of newsprint continued to decline due to the low price, and this situation is treated in detail elsewhere in this Review Number.

On April 1st, 1936, the price of book papers and coated papers was advanced. Book paper prices went up from $3 to $5 per ton and coated prices from $5 to $11 per ton. A little later paperboard prices were increased $5 per ton.

These advances were not sufficient to offset entirely the increased cost of raw materials and labor. Paper prices as a whole have not kept step with the advances made in the prices of other commodities since 1933.

The Reciprocal Trade Agreements

The signing of the Reciprocal Trade Agreements with Sweden, Canada, Belgium, France, The Netherlands and Finland has served to aggravate the United States paper industry's price problem. According to Mr. Warren B. Bullock, manager of the Import Committee of the American Paper Industry, which keeps track of paper imports and maintains a constant battle to see that they are properly classified, the Swedish trade agreement, consumated last August, increased the rate of importation of kraft wrapping paper in the last five months of 1935 to 8,000 tons as compared with 4,000 tons in 1934.

Imports of kraft wrapping paper for the first quarter of 1936 were at the rate of 23,000 tons per year or nearly six times the rate of 1934 imports of this grade. Mr. Bullock states that, "This volume of imports will deprive of employment for one year one American paper mill employee in every forty now employed in American kraft paper mills."

The Swedish agreement reduced the tariff on kraft wrapping from 20 per cent to 25 per cent. The Finnish agreement, recently concluded, further reduces the rate to 20 per cent, thereby giving Sweden the same rate, and furnishing a market for new Finnish kraft mills now under construction.

In the recently negotiated French trade agreement the rate of duty on cigarette paper was reduced from 60 per cent to 45 per cent, which is 5 per cent lower than that set by the previous low Underwood Tariff Act of 1913, which was 50 per cent. Mr. E. H. Naylor, secretary of the Writing Paper Manufacturers Association, points out that this reduction is equivalent to a gift of $600,000 per year to American cigarette manufacturers, on the basis of the present volume of imports. The reduction per package of cigarettes would be so small as to make it impossible to pass on to the consumer, hence it amounts to a gift to the cigarette makers. A large part of the present imports of French cigarette papers comes from mills controlled by American cigarette manufacturers.

The reduction prevents the development of an American cigarette paper industry which has been showing signs of assuming important proportions and could eventually produce $7,000,000 per year for the employment of American workmen.

The Belgian agreement reduced the rate on vegetable parchment by one-third. Foreign parchment is now enter-

ESTIMATED 1935 UNITED STATES WOOD PULP PRODUCTION AS PER CENT OF ACTIVE CAPACITY, BY REGION AND GRADES

Region.	Sulphite — Bleached	Sulphite — Unbleached	Sulphate — Bleached	Sulphate — Unbleached	Ground-wood	Total
New England	66%	72%	0%	*	70%	69%*
New York and Pennsylvania	83%	62%	0%	0%	50%	59%
Lake States	82%	74%	120%	74%*	51%	68%*
South	72%	61%	99%	91%	73%	90%
West Coast	93%	82%	135%	96%	73%	85%
Total for U. S.	80%	74%	109%	88%	61%	75%

*Production and capacity of unbleached sulphate in New England included in Lake States to avoid disclosing individual mill's figures.
Source: United States Pulp Producers Association.

PULP WOOD CONSUMPTION—1923-1935

Pacific Coast States and British Columbia

	1923 Cords	1924 Cords	1925 Cords	1926 Cords	1927 Cords	1928 Cords
Washington	191,751	230,299	241,150	305,787	455,664	651,657
Oregon and California	205,199	205,968	209,349	232,989	267,233	308,264
British Columbia*	267,000	266,000	284,100	318,500	364,000	383,008
Total Pacific Coast	**663,950**	**702,267**	**734,599**	**857,276**	**1,076,899**	**1,342,929**

	1929 Cords	1930 Cords	1931 Cords	1932 Cords	1933 Cords	1934 Cords	1935‡ Cords
Washington	956,132	1,000,001	1,025,878	688,326	1,094,852	1,334,000	1,412,124
Oregon and California	340,745	351,053	319,876	265,470	241,841	288,000	538,076
British Columbia*	352,444	373,397	363,688	304,185	375,450	428,287	402,000
Total Pacific Coast	**1,649,321**	**1,724,451**	**1,709,442**	**1,257,981**	**1,712,143**	**2,050,287**	**2,352,200**

Source—U. S. figures from U. S. Dept. of Commerce, Bureau of Census; B. C. Figures from Dept. of Lands, Forest Branch; and Dominion Bureau of Statistics.
*British Columbia figures prior to 1928 are not shown separately and are estimated on basis of 1.23 cords of wood consumed per ton of wood pulp produced.
‡Estimated.

UNITED STATES WOOD PULP CAPACITY BY REGIONS

1934 – 1935*

(Tons of 2000 pounds)

Region.	Total All Grades*		Sulphite		Sulphate		Groundwood	
	1934	1935	1934	1935	1934	1935	1934	1935
New England—Total	1,490,325	1,477,460	566,525	578,460	49,600	80,600	874,200	818,400
Active	1,405,230	1,373,920	550,250	548,390	31,000	62,000	823,980	763,530
Idle	85,095	103,540	16,275	30,070	18,600	18,600	50,220	54,870
New York and Pennsylvania	981,305	939,920	344,875	334,180	0	0	636,430	605,740
Active	791,585	763,530	318,525	290,160	------	0	473,060	473,370
Idle	189,720	176,390	26,350	44,020	------	0	163,370	132,370
Lake States	1,363,535	1,288,980	525,140	494,450	283,340	256,060	555,055	538,470
Active	1,339,665	1,232,870	509,640	472,750	283,340	256,060	546,685	504,060
Idle	23,870	56,110	15,500	21,700	0	0	8,370	34,410
West Coast	1,296,265	1,256,430	666,345	639,220	238,700	256,060	391,220	361,150
Active	1,207,450	1,184,820	636,430	639,220	192,200	195,300	378,820	350,300
Idle	88,815	71,610	29,915	------	46,500	60,760	12,400	10,850
South	1,213,650	1,293,630	93,000	94,550	1,088,100	1,170,870	32,550	28,210
Active	1,188,850	1,268,830	93,000	94,550	1,063,300	1,146,070	32,550	28,210
Idle	24,800	24,800	0	0	24,800	24,800	0	0
Total	6,345,080	6,256,420	2,195,885	2,140,860	1,659,740	1,763,590	2,489,455	2,351,970
Active	5,932,780	5,823,970	2,107,845	2,045,070	1,569,840	1,659,430	2,255,095	2,119,470
Idle	412,300	432,450	88,040	95,790	89,900	104,160	234,360	232,500

*Except Soda and Special Grades of Pulp.

Sources: Capacity—U. S. Pulp Producers Association's Basic Survey of the Pulp Industry. Rated annual capacity on 310-day basis. 1935 figures as of January 1st, 1936.

ing and being delivered for 12 cents per pound, while the American price, having been reduced is now 14 cents per pound, the former cost of production. American mills are endeavoring to cut costs to as to make a small profit at the low price forced by the Belgian agreement.

The trade agreement with The Netherlands reduced the rate on bristol board by one-third. February, 1935, the first month the agreement was in operation, the imports were 100 per cent in excess of the imports in 1935.

The Netherlands treaty also reduced the rate of duty on nine-point corrugating straw board by 50 per cent, and Mr. Bullock states that the records show the first month under the agreement witnessed the imported straw selling at $10 per ton below American board. Further, imports of strawboard of this type were for that month larger than the total for the three preceding years.

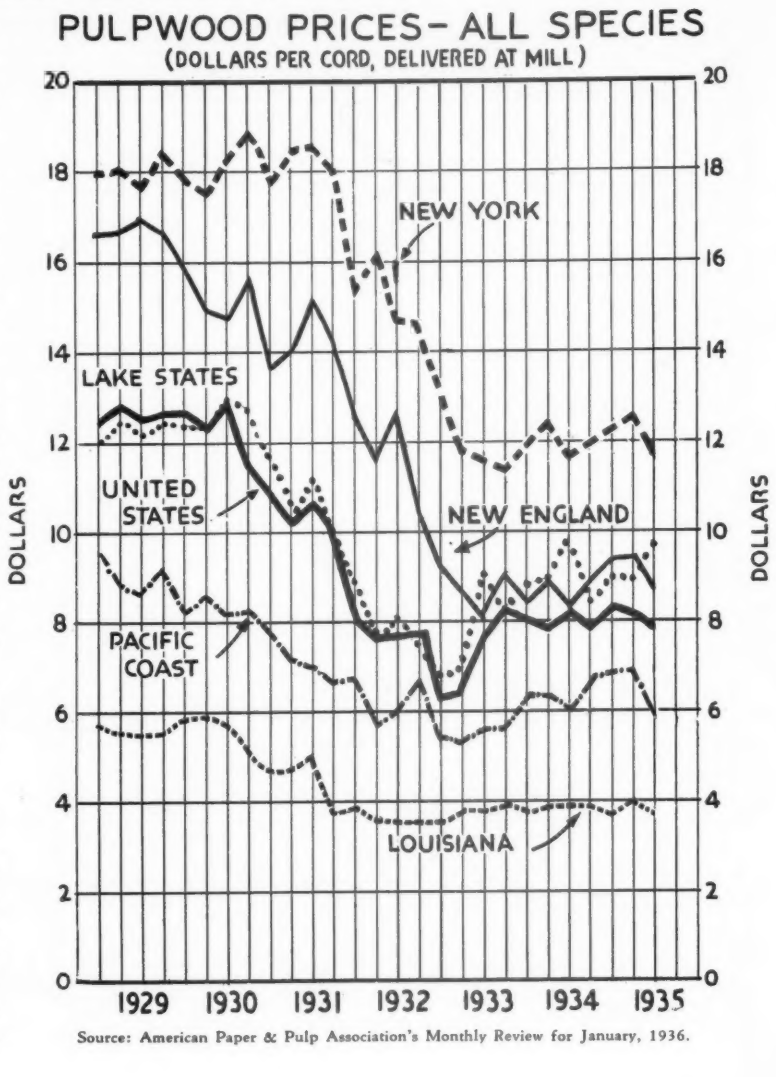
The Swedish agreement also reduced the rate of duty on machine glazed sulphite wrapping papers from 30 per cent to 25 per cent. As a result tonnage imported for the first quarter of 1936 totalled more than one-third of the entire imports in 1935. Imports of wrapping paper, other than kraft, were larger in the first four months of 1936 than in the entire year of 1934.

The Department of State has "bound" on the free list (a step of questionable legality) practically every type of pulp imported through concessions in the Canadian, Swedish and Finnish agreements.

Price Control in Foreign Hands

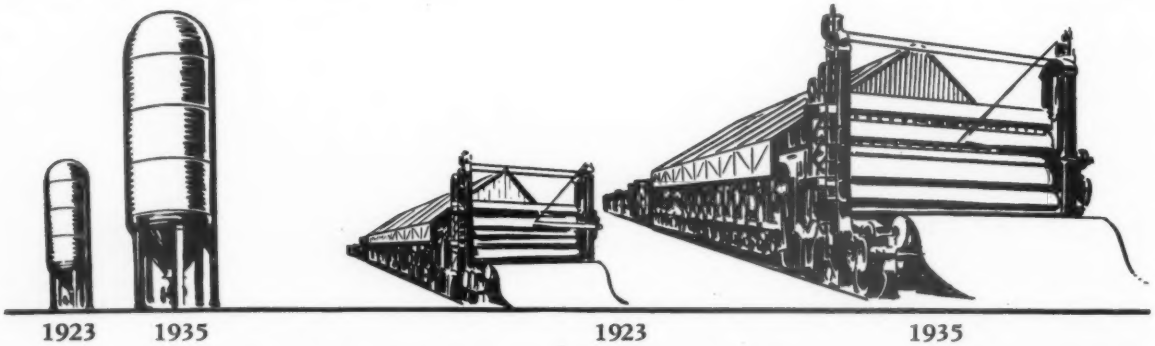
As Mr. Bullock points out, the most important feature of these duty reductions and "bindings," is to place the control of American pulp and paper prices entirely in the hands of foreign producers, who pay low wages, enjoy government subsidies of one kind or another, and who enjoy low freight charges. Furthermore, the opening of American pulp and paper markets permits foreign producers to operate at a higher level, a larger proportion of capacity, thereby reducing their costs, while American mills

(Continued on page 24)



Source: American Paper & Pulp Association's Monthly Review for January, 1936.

COMPARATIVE GROWTH OF PACIFIC COAST PULP AND PAPER INDUSTRY—1923-1935



Total Daily Capacity All Grades of Pulp

1923—2,045 tons

1935—6,004 tons. Increase: 194%.

Total Daily Capacity All Grades of Paper and Board

1923—2,056 tons

1935—4,865 tons. Increase: 137%.

AGAIN IN 1935

FOREIGN PULP MILLS SOLD 82%
U. S. PULP MILLS SOLD 18%

Of All Pulp Sold in the United States

IN 1935 as in 1934 American producers of pulp for the market obtained but 18 per cent of their own domestic market. Foreign pulp producers again dominated the American pulp market, as has been the situation for many years, with sales amounting to 82 per cent of the business.

However, American producers did gain slightly in their own market the gain being .46 per cent or less than half of one per cent, hardly enough to alter the percentages materially.

The situation is paradoxical. The United States with the largest commercially utilizable forests in the world, with the possible exception of Russia, is the world's largest importer of wood pulp.

Pulp Imports

The year 1935 brought a new record in wood pulp imports with a total of 1,933,631 short tons of a declared value of $70,680,987, as compared with 1,612,615 long tons valued at $61,778,269 in 1934, and imports of 1,733,744 long tons valued at $57,399,010 in 1933.

The increase of imports in 1935 over 1934 was 127,515 short tons or approximately 7 per cent, contrasted with the decline of 7 per cent in 1934 over 1933 imports.

Value of 1935 imports went up 14.4 per cent over the value of 1934 imports which were 7.6 per cent greater in value than the 1933 imports. The 1935 value of $70,680,987 was $13,281,977 greater than the $57,399,010 value of 1933 wood pulp imports or 22 per cent greater.

Sweden Largest Supplier

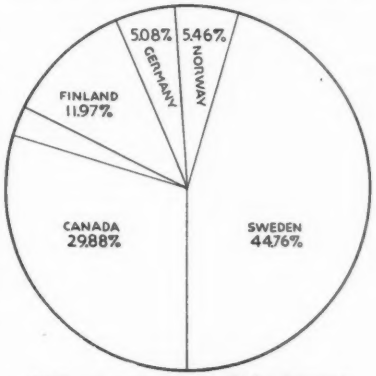
Sweden was again the largest supplier of wood pulp in the United States market with 46.79 per cent of all the pulp imported during 1935, an increase in Sweden's share of 1.73 per cent.

Canada, the second largest supplier of pulp to the American market dropped 2.29 per cent from 29.88 per cent of all imports in 1934 to 27.59 per cent in 1935.

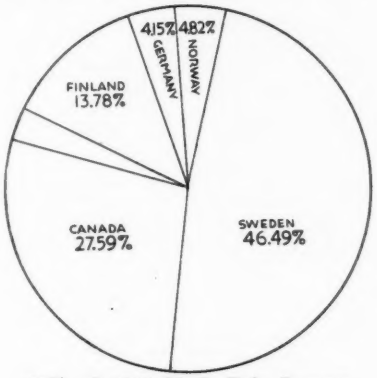
Finland, the third largest supplier, increased its share of American imports by 1.81 per cent, going from 11.97 per cent in 1934 to 13.78 per cent in 1935.

Germany's share of the American pulp imports dropped .83 per cent from 5.08 per cent to 4.15 per cent.

Norway's exports to this country likewise declined, the percentage decline being .64 per cent from 5.46 per cent in 1934 to 4.82 per cent in 1935.



97% of 1934 U. S. Pulp Imports From Five Countries



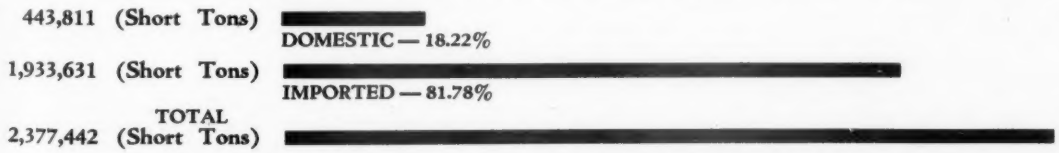
97% of 1935 U. S. Pulp Imports From Five Countries

PROPORTION OF UNITED STATES MARKET FOR PULP SUPPLIED BY AMERICAN PULP MILLS AND FOREIGN PULP MILLS*—1934-1935

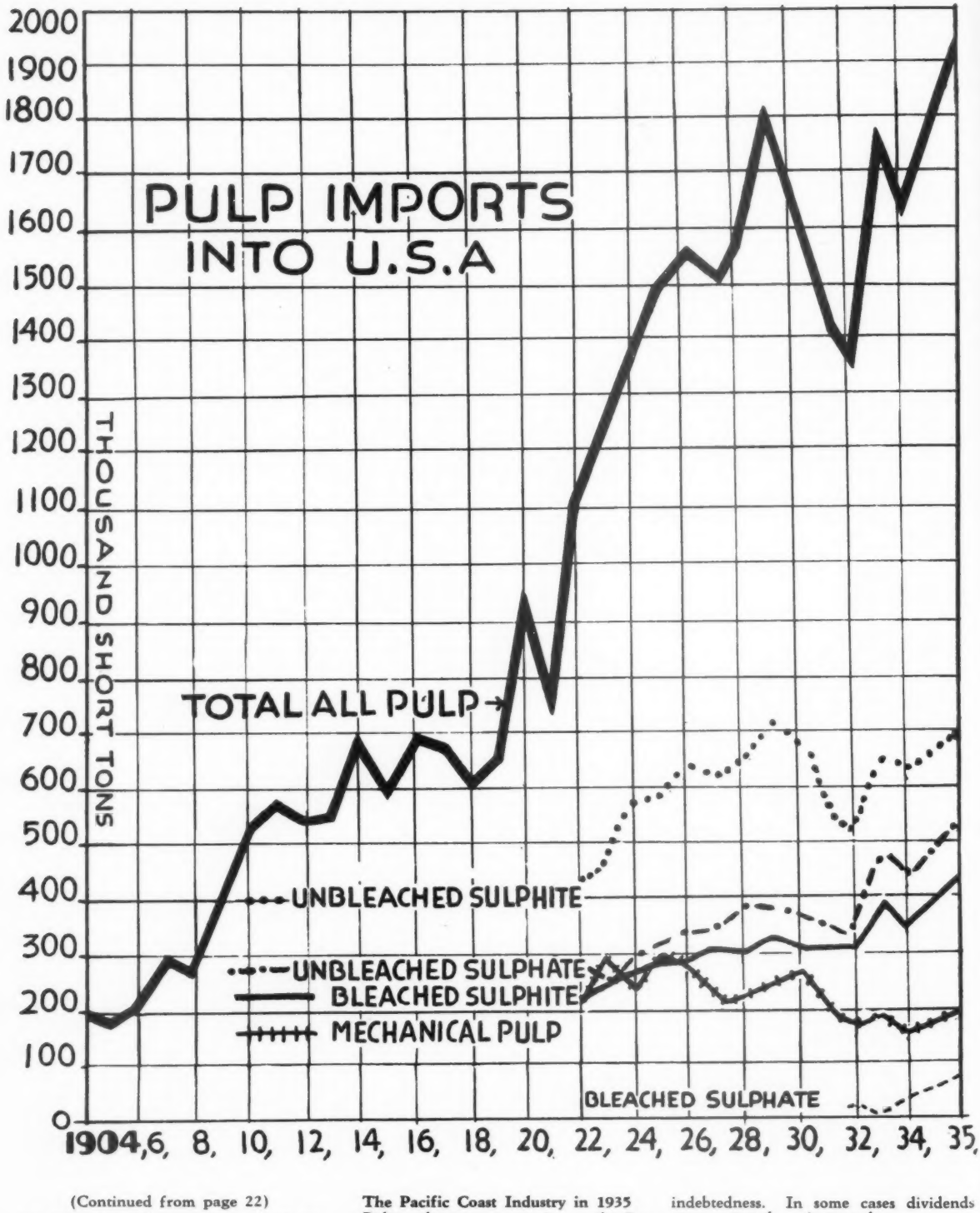
Tons—2,000 Lbs.

TOTALS By Grades.	1934 Pulp Produced By U. S. Mills for Sale in Domestic Market—1934	1934 Pulp Imported Into the United States 1934	1935 Pulp Produced By U. S. Mills for Sale in Domestic Market—1935	1935 Pulp Imported Into the United States 1935
Total—All Grades (Except Soda Pulp)	388,456	1,798,664	443,811	1,933,631
Total—Sulphite	361,229	977,773	412,631	1,122,448
Bleached Sulphite	282,738	398,142	328,460	429,423
Unbleached Sulphite	79,375	675,491	84,921	693,026
Total—Sulphate	4,382	481,435	8,207	611,342
Bleached Sulphate	1,191	54,068	1,563	84,658
Unbleached Sulphate	3,191	427,367	6,644	526,684
Total Groundwood	21,486	189,374	20,508	190,041
Total—Miscellaneous, Damaged and Off-Quality	1,865	153	2,110	391

*Table prepared by Pacific Pulp & Paper Industry from United States Pulp Producers Association data on 1934 and 1935 wood pulp production, shipments and stocks; and from import data supplied by the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce. 1934 imports in this table have been changed to short tons for the purpose of comparison with American production figures.



Total Pulp Purchased by American Paper Mills in 1935 (Except Soda Pulp)



(Continued from page 22)

are operating at between 70 and 80 per cent of capacity with the resulting higher costs. Prices of pulp and paper in Europe are controlled by cartels, which are prohibited in this country. In other words the American pulp and paper producers suffer from price fixing combinations in foreign hands, but their own government prevents them from defending themselves through any sort of combination.

The Pacific Coast Industry in 1935

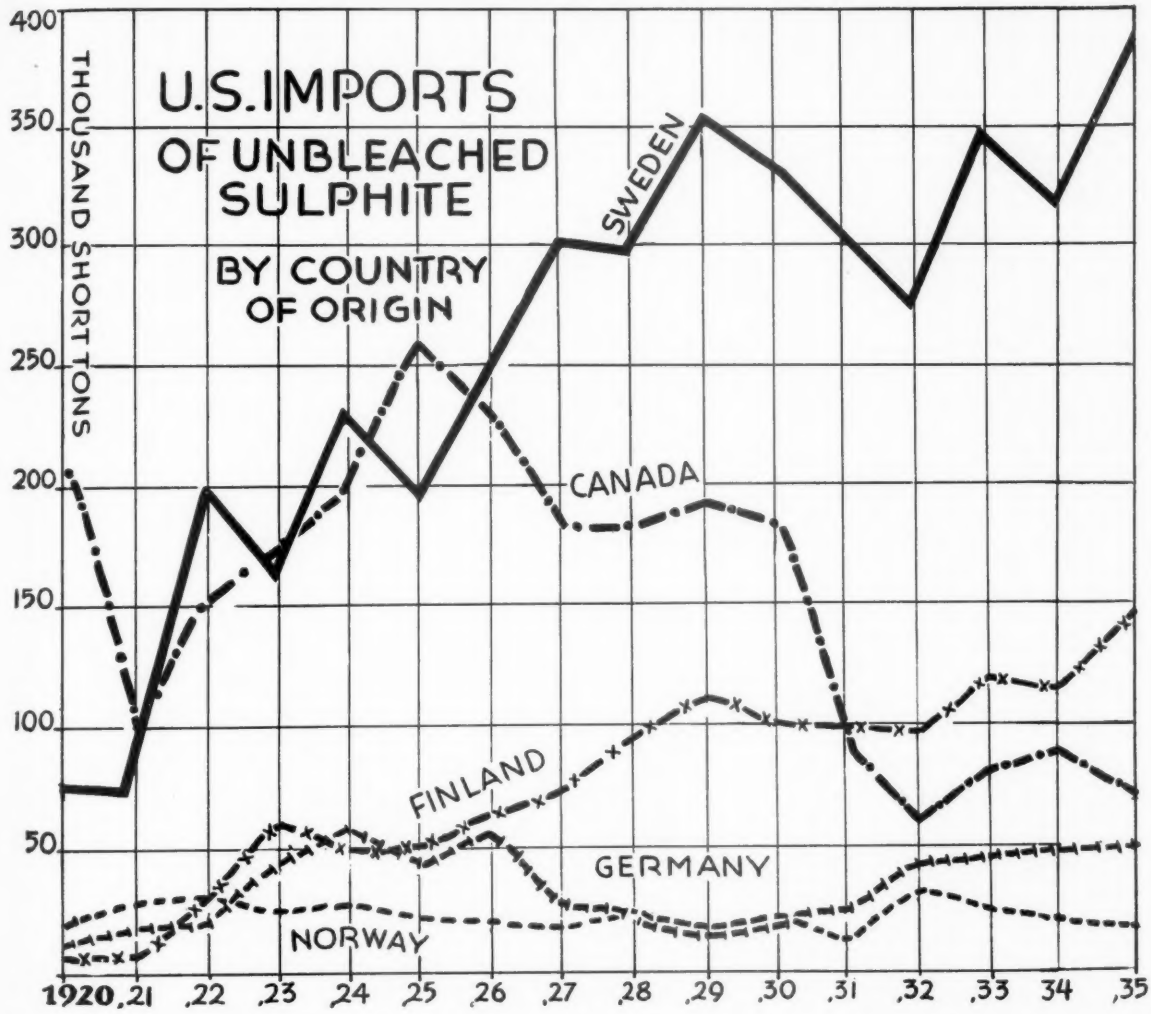
Pulp and paper companies on the Pacific Coast during 1935 made distinctive progress, although the advance made was not as profitable generally as the large investment of capital justifies.

As a whole the industry was in much better financial condition than at the end of 1934. However, a number of companies still had unpaid preferred dividends and bond moratoriums to remind them that they were not in the clear as yet. Advances were made in reducing indebtedness. In some cases dividends were resumed or increased.

Pacific Coast pulp producers manufacured 10 per cent more pulp in 1935 than in 1934, but did not receive as much money for it due to the cut in price instigated by foreign producers in March 1935.

Mill Improvements

Faced with a reduction in the market price of pulp, with wage increases, higher cost raw materials, higher taxes and with a paper market priced too low, Pacific



Coast manufacturers turned to their own plants as holding the key to either breaking even or making a profit.

Improvements in equipment and increased efficiency in methods applied to the production processes, were the outstanding features of the Pacific Coast industry in 1935.

Already a modern industry in comparison with plants and equipment in older sections of the United States, the Pacific Coast men invested large sums of money in new equipment and expended time and thought to simplifying production systems. The result was a better year in dollars and cents than 1934, as well as an industry which collectively is in a stronger position today to compete in world markets than ever before in its history.

Most of the mill improvements while contributing toward reduction costs, also aided materially in improving the quality of the finished products.

Attention to Wood Cleaning

Pulpwood preparation, which has long been considered out-of-date by Pacific Coast operators, has been vastly improved through the perfection of new equipment long in process of development, and the introduction of simplified methods of handling.

Cleaner wood at less cost was the result, although investments made in these new plants has been very large. Among the plants paying particular attention to improvements in wood preparation were the Washington Pulp & Paper Corporation in Port Angeles, Washington, which built a complete new log breakdown plant; the Olympic Forest Products Company, also of Port Angeles; the Grays Harbor Pulp & Paper Company of Hoquiam, Washington; The British Columbia Pulp & Paper Company of Woodfibre and Port Alice, B. C.; the Longview Fibre Company of Longview, Washington; the Soundview Pulp Company, Everett, Washington; the Puget Sound Pulp & Timber Company at Bellingham and Anacortes, Washington; the Shaffer Pulp Company of Tacoma, Washington; the Coos Bay Pulp Corporation at Empire, Oregon; the Weyerhaeuser Timber Company's Pulp Division at Everett, Washington (a new mill with new ideas of wood cleaning); the Crown Willamette Company's Cathlamet, Washington breakdown plant; and, the Rainier Pulp & Paper Company of Shelton Washington, which started construction of a new log breakdown plant in June, 1936.

Cooking Improved

Cooking methods came in for intensive study by a number of pulp mills during 1935 and the first half of 1936, in an effort to improve quality, increase yield and to reduce sulphur and steam consumption. Chemipulp systems were installed by Pacific Mills, Limited, Ocean Falls, B. C.; the British Columbia Pulp & Paper Company at its Woodfibre and Port Alice mills; by the Soundview Pulp Company of Everett, Washington; the Puget Sound Pulp & Timber Company at Bellingham, Washington; the Crown Willamette Paper Company, West Linn, Oregon; Columbia River Paper Mills, Vancouver, Washington, and by the new Weyerhaeuser Pulp Division unbleached sulphite pulp mill at Everett, Washington.

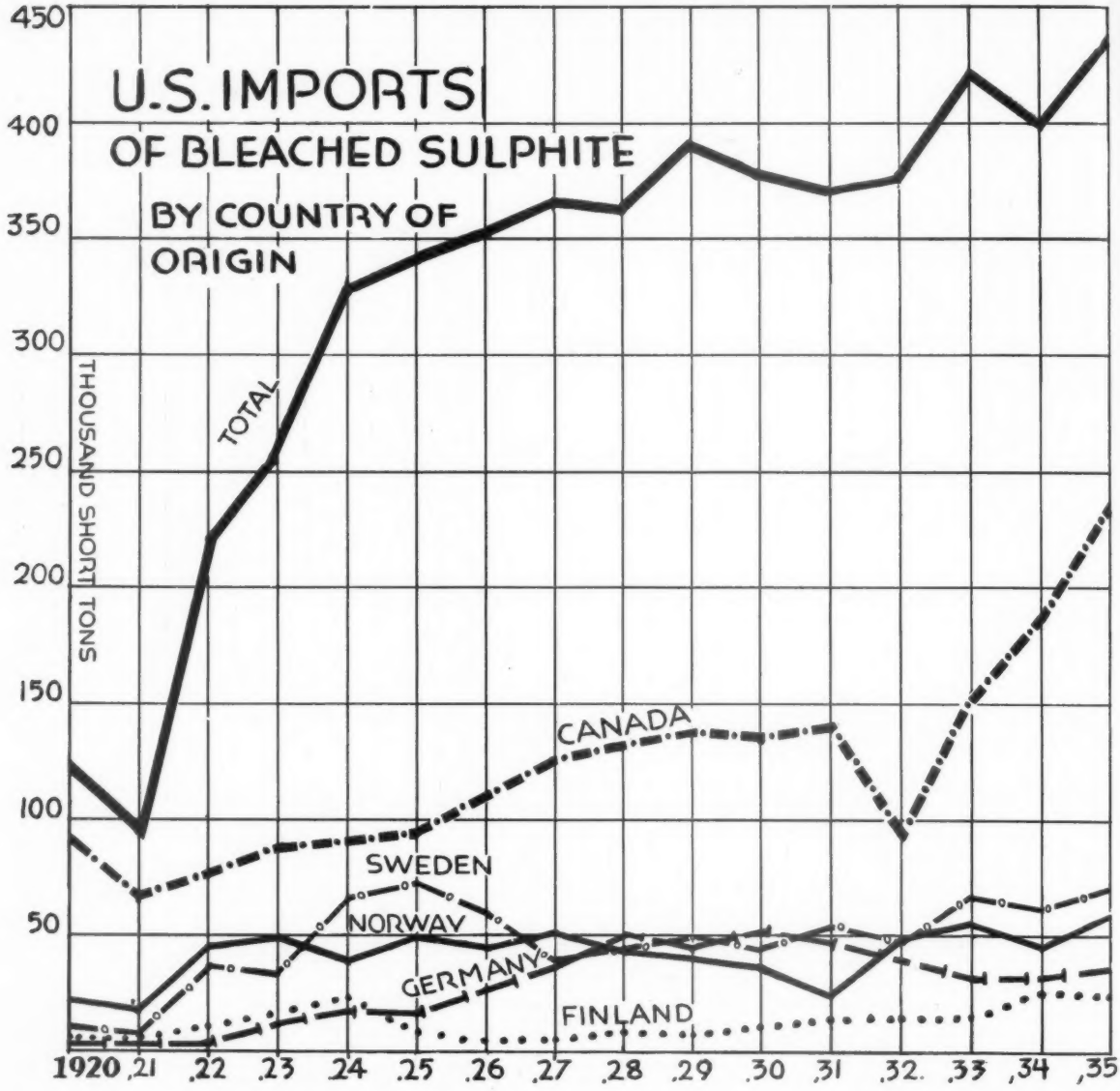
Circulating systems were installed by Crown Willamette at its Lebanon, Oregon, mill and in the Crown Willamette Camas, Washington, mill where several digesters had previosuly been so equipped.

Bleaching

The controversy over the most efficient methods of bleaching sulphite and sulphate pulp continued to rage, with different mills achieving similar results through the application of different methods.

Washing and Screening

Stock washing came in for attention along with studies of screening. New types of screens were installed in a number of mills to replace higher horsepower units which were no longer economical. Screen plates were examined and more attention given to the correct slot size. Many mills employed chromium plated



plates and experiments were carried on with the new stainless steel plates.

New Construction and Expansion

The largest development of 1935 was the construction of the new Weyerhaeuser Timber Company's Pulp Division 150 tons per day unbleached sulphite pulp mill at Everett, Washington. The announcement was made in February, 1935, and construction began shortly thereafter. The mill began operations in June, 1936. The mill will produce high quality unbleached sulphite pulp.

Grays Harbor Pulp & Paper Company completed an improvement program in January, 1935, which included the installation of a fourth digester, additional flat screens, more pumps, a new washer and auxiliary equipment. The new digester produces rayon pulp, which the company began to manufacture upon completion of the improvements in cooperation with the Rainier Pulp & Paper Company, the pioneer Pacific Coast producer of rayon pulps.

In March, 1935, a new company was formed by Mr. K. O. Fosse and associates to acquire the old Sitka Spruce Pulp & Paper Company's unbleached sulphite pulp mill at Empire, Oregon. The new organization was named the Coos Bay Pulp Corporation, and after a thorough rebuilding of the mill, operations were begun in August.

The St. Helens Pulp & Paper Company added a Yankee dryer to one of its paper machines and later enlarged its main mill building through the addition of a second story.

The Washington Pulp & Paper Corporation completed a new and modern water filtration plant early in the year. The West Linn mill of the Crown Willamette Company likewise completed a modern filter plant at West Linn, Oregon. In both cases the improvements were aimed to provide cleaner water and improve the color of the finished papers.

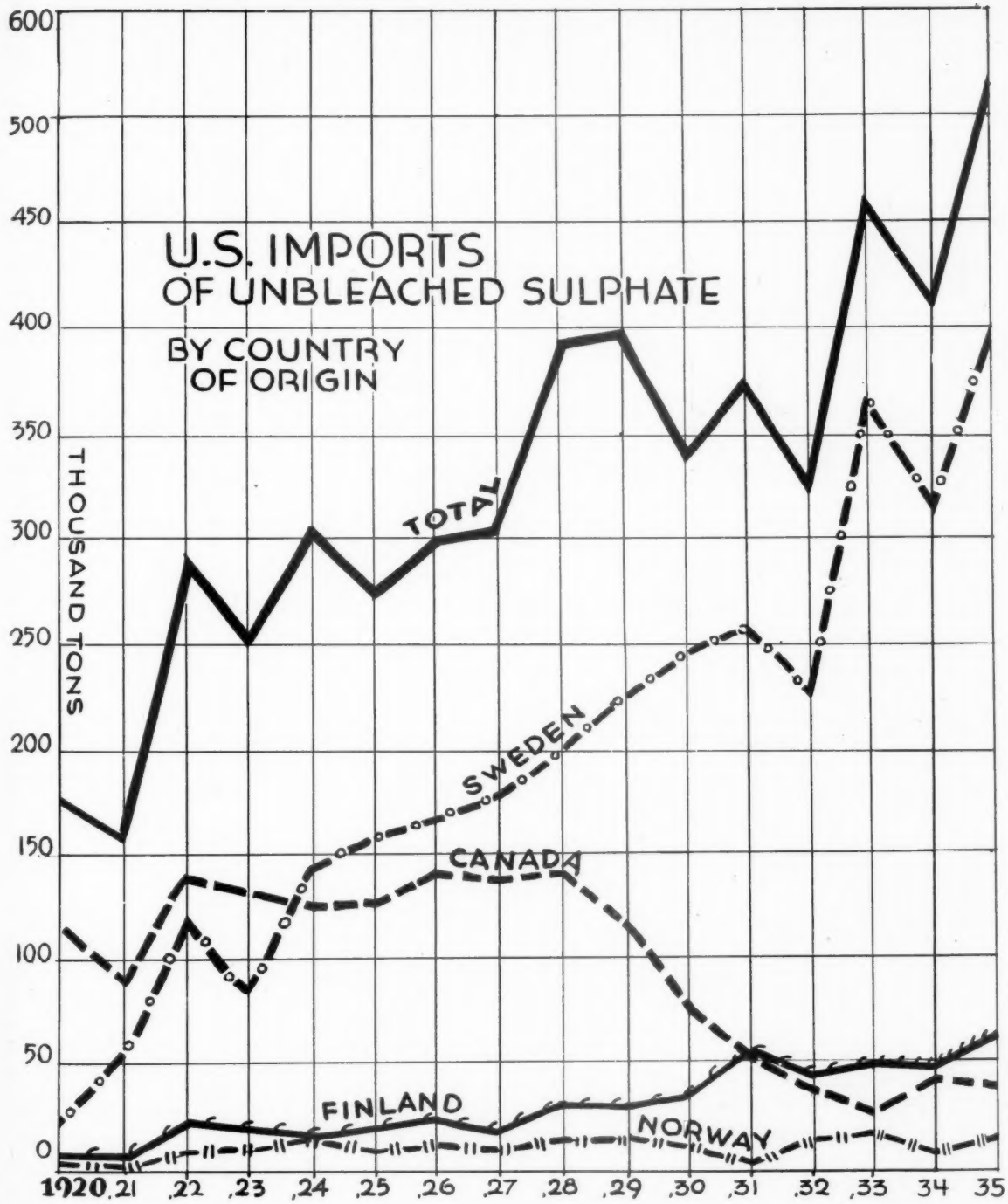
The Powell River Company of Powell River, B. C., largest newsprint producers on the Pacific Coast, completed an improvement program designed to raise the quality of its newsprint. A new concrete building was constructed to house equipment for producing a brighter sheet. New washers were added and improvements made to several of the paper machines.

The Longview Fibre Company of Longview, Washington, completed a waste paper stock preparation plant in May, 1935, which was to be used as an auxiliary unit.

The Rainier Pulp & Paper Company of Shelton, Washington, built a new warehouse, enlarged its waste liquor recovery system, and started in June, 1935, the largest research laboratory on the Pacific Coast, which was completed in April, 1936. A description of this well equipped research building was published in the May, 1936, issue of PACIFIC PULP & PAPER INDUSTRY.

The Soundview Pulp Company added a sixth digester in the fall of 1935 to stabilize production and to compensate for time lost in relining the other digesters.

The British Columbia Pulp & Paper Company embarked early in the fall on a program of modernizing its sulphite pulp mills at Port Alice and Woodfibre, B. C. The improvements were comprehensive, embracing practically every department of both mills. The changes were aimed to further improve the quality of the pulp.



The California Fruit Wrapping Mills of Pomona, California, constructed a new warehouse in which fifteen thousand square feet were set aside for tissue converting.

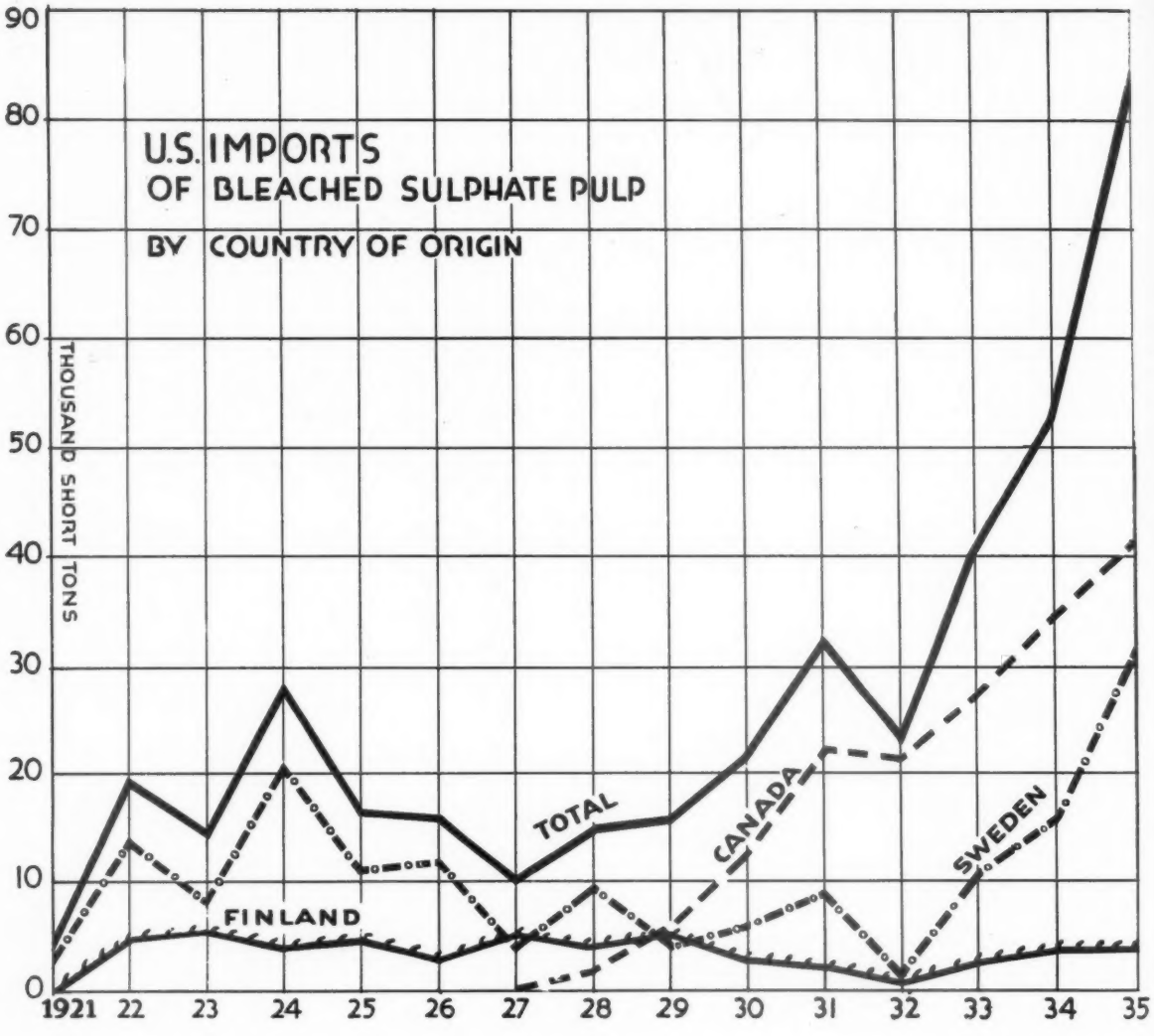
The Crown Willamette Paper Company early in 1936 replaced two kraft digesters at the company's Camas, Washington, mill with new and larger ones and added one new kraft digester. One kraft digester at the Ocean Falls, B. C., mill of Pacific Mills, Limited, was replaced.

The Lloyd A. Fry Roofing Company and its subsidiary, the Volney Felt Mills, were organized in January, 1936, and announced their roofing mill would be ready for operation at Compton, California, by June, 1936. The plants' capacity is 5,000 tons per year.

The Royal Container Company of San Francisco, built a new plant during 1935 for manufacturing fibre shipping cases.

On March 14th the Inland Empire Paper Company of Millwood, Washington, was reorganized and a program of mill improvements begun which will by August, 1936, affect practically every department of the mill. In addition to newsprint which the mill has produced right along, a number of higher grades of paper will be added.

In May, 1936, the St. Regis Kraft Company, a subsidiary of the St. Regis Paper Company, announced the re-opening of its sulphate pulp mill in Tacoma, Washington. After a program of rebuilding and adding of much new equipment, it is expected the mill will be ready to operate late in the fall of 1936, producing 55,000 tons per year of sulphate pulp both bleached and unbleached.



The Soundview Pulp Company of Everett, Washington, announced the latter part of May, 1936, that the company's 200-ton per day bleached sulphite mill would be expanded by 120 tons per day or 60 per cent. Operation of the new unit is expected to begin in March, 1937. Buildings will be constructed to provide for further expansion to an ultimate daily capacity of 440 tons.

The Crown Willamette Paper Company at Camas, Washington, constructed a new warehouse and dock during 1935 and 1936. The new unit contains several unusual ideas in material handling.

The foregoing brief outline of expansions and improvements made by Pacific Coast mills during the past year is intended to cover the highlights only, and is far from a complete survey of the improvements carried out and the equipment installed during the year. This summary is aimed to provide an idea of the attention paid by the managements of Pacific Coast pulp and paper mills to improve quality by keeping their plants modern and in first-class operating condition.

TAPPI and Superintendents

Both the Technical Association of the Pulp & Paper Industry and the American Pulp & Paper Mill Superintendents' Association, Pacific Coast sections, were active during the past year.

Meetings were well attended and the programs of technical and practical papers presented when viewed from the entire year, were of varied interest, and as a whole were helpful contirbutions to the industry. The papers for the most part dealt with Pacific Coast problems.

During the year TAPPI inaugurated a series of dinner meetings which proved very popular. By locating the dinners at various mill towns a large number of the younger men attended, which achieved the aim of the TAPPI officers in bringing the organization's work to the newer men in the industry.

The discussion group meetings sponsored by the Superintendents' Association created interest and brought out many useful ideas on problems common to West Coast mills.

Planning Commissions

Both the Washington and Oregon State Planning Councils issued reports on the forestry situation in the two states, accompanied by recommendations as to methods to be employed in bringing about the much-discussed practice of sustained-yield forest management.

Wage Agreements

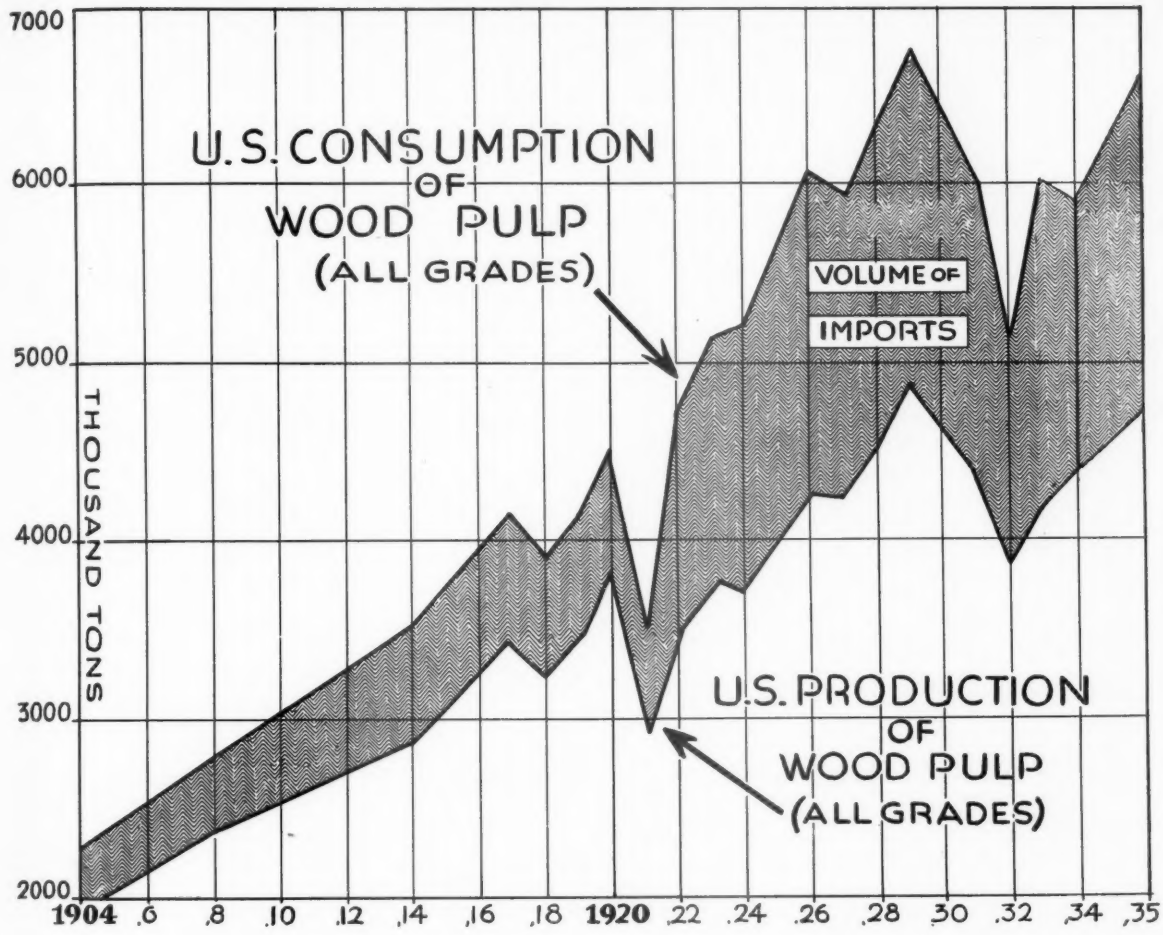
For the third successive year the two unions, the International Brotherhood of Paper Makers and the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, signed wage and hour agreements with almost all of the pulp and paper mills on the Pacific Coast.

The agreement, dated May 31st, 1936, provided for the highest hourly wage rates paid in the American pulp and paper industry, higher by about 18 per cent than in any other section.

The cooperative spirit manifested by both the unions and the employers reflects great credit on the Pacific Coast industry and is indicative of the high type men engaged in pulp and paper making in the Western part of the United States.

Both strikes and lockouts are prohibited in the agreement, thus insuring steady operations for the mills and steady incomes for the union members throughout the year.

The yearly wage agreements, their form and the machinery which they set up for arbitrating any disputes that may arise, are considered examples to all labor and all employers in the United States.



The Paper Trade

The selling branch of the paper industry on the Pacific Coast experienced an active year, holding its annual convention at Del Monte, California, in May, 1936. Through cooperative efforts trade practices have been improved materially during the year, to the resulting profit of all distributors. Although there was some let-down when the NRA code was abolished in June, 1935, those who sold below cost and who violated recognized standards of fair business standards have fortunately been in the minority.

The paper mill representatives in Southern California, numbering some one hundred and twenty-five, formed an informal organization chiefly for social purposes, and have been active since organizing early in 1935. Much has been done through this group to create better feeling among competitors in the Southern California area.

The Japanese-Canadian Trade War

Following an exchange of notes between Japan and Canada, in which Japan insisted Canada was unfair in valuing for import purposes the yen at so high a rate, and Canada's refusal to reduce the exchange rate, Japan slapped a 50 per cent duty on all Canadian products entering Japan after July1st, 1935.

This effectively stopped the exportation of British Columbia pulp and paper to Japan, resulting in heavy losses to Canadian producers. The problem was settled the first of 1936 by Canada agreeing to reduce the exchange value of the Japanese yen from 41.5 to 39.5 cents, its five year average. The agreement specified the yen was to be revalued each year on the basis of an average for the previous five years. In 1937 it will be 34 cents, and in 1938 it will very likely be 29 cents.

After the settlement the exportation of pulp and paper from British Columbia to Japan was resumed along with the importation of various Japanese products.

Raylig

During the year the Rainier Pulp & Paper Company of Shelton, Washington, placed on the market its new road binder, Raylig, a dehydrated waste sulphite liquor. The new product was marketed only after exhaustive tests had shown it to be superior from both cost and result viewpoints. A sales department was formed and cities, counties and road districts throughout the state of Washington quickly exhibited interest in the new road material for secondary roads. In the spring of 1936 a tanker was chartered and over 1,300,000 gallons of Raylig was shipped to the highway department of the state of New Jersey for application on roads.

The new road product promises to be one method of solving the problem of profitably using waste sulphite liquor.

The Hale Report

In the August, 1935, number of PACIFIC PULP & PAPER INDUSTRY appeared an analysis of Senate Document 115, known as the Hale Report, because it resulted from a resolution introduced by Senator Hale of Maine. The report finally issued by the Secretary of Agriculture was entitled "National Pulp and Paper Requirements in Relation to Forest Conservation."

Senator Hale in his resolution asked the Forest Service to prepare from available data a report showing:

"(a) The extent to which the United States now depends upon imports of pulpwood, pulp and paper to meet national requirements;

(b) Whether and the extent to which it is now possible with known pulp and paper processes to supply from the forest lands of the United States all of the pulpwood needed to meet the national pulp and paper requirements;

(c) What adjustments are feasible and necessary and what program of forest conservation is recommended for the immediate and more distant future by the Federal Government, the states, the pulp and paper industry, and private owners of forest lands to make the United States self-supporting in its pulpwood, pulp and paper requirements; and

(d) Whether it would advance or retard the program of forest conservation to make the United States self-supporting as to pulpwood, pulp, and paper requirements from American forests."

The report, issued nearly a year and a half after Senator Hale's resolution had been passed by the Senate, showed the facts, although it was obvious a very thorough attempt had been made to sub-

merge them, very likely because they clearly showed the foreign trade policy of the Administration was entirely out of harmony with the American forestry situation.

The analysis presented in our August 1935 issue, showed that the full utilization of American forests would be of tremendous benefit to the country in employment, in benefit to agriculture, to the lumber industry, to both soil and forest conservation, and would contribute to economic and social security.

It was obvious from reading of the report that the facts strongly urged full development of the pulp and paper industry in the United States.

The Timber Survey

In the 1935 Annual REVIEW NUMBER of this journal was published the pulpwood portion of the timber survey, completed in 1934 by the United States Forest Service, covering Western Oregon and Western Washington. In summarized and revised form it is reprinted in this number as reference data.

The survey shows that the forest resources of the area covered justify further development of pulp and paper manufacturing as an economic outlet for much of the regions timber.

The report, as released by the Pacific Northwest Forest Experiment Station of the U. S. Forest Service, also shows that the area tributary to Grays Harbor, Washington, possesses the largest stands of hemlock and spruce pulpwood as compared with any similar area in Western Washington or Western Oregon.

Research

Research in the pulp and paper industry came in for a share of development during the past year. In July, 1935, the Crown Zellerbach Corporation formed a research department under the direction of Dr. E. C. Lathrop as director.

The Rainier Pulp & Paper Company of Shelton, Washington, completed in April, 1936, a modern thoroughly equipped research laboratory which is able to produce rayon as a means of testing the company's pulp made for rayon manufacturing purposes.

Among the colleges and universities which carried on research work on problems allied to the pulp and paper industry, were, the University of Washington, the University of Idaho, and Oregon State College.

At the University of Washington in Seattle, a new building is under construction for the chemistry department and will be completed in December, 1936. It will house a semi-plant laboratory designed for work on pulp and paper mill problems, and will be equipped with the latest scientific apparatus.

The research department of the Pulp Division, Weyerhaeuser Timber Company, Longview, Washington, continued its studies of problems affecting the manufacture of sulphite pulps.

The Pacific Northwest Forest Experiment Station, U. S. Forest Service, Portland, Oregon, continued its forest research work. (See May, 1936, issue of PACIFIC PULP & PAPER INDUSTRY.)

Safety

Safety work continued to hold the attention of mill executives. The Crown Zellerbach Corporation extended its work through the forming of a department under Mr. M. L. Mammen, an experienced safety engineer, and special programs were worked out for reducing the accident problem in the mills affiliated with Crown Zellerbach.

The Tariff Commission Investigation

In accord with a Senate resolution introduced by Senator Borah of Idaho in August, 1935, known as No. 200, the Tariff Commission was empowered "to investigate and report to the Senate all facts relating to wood pulp, or pulpwood, showing the volume of importations compared with domestic production, and the conditions, causes and effects relating to foreign competition, and all other facts showing the differences in, or which affect competition between, the production of wood pulp, or pulpwood, in the United States or that imported in the principal markets of the United States."

The Tariff Commission sent field crews out to check pulp and paper mill records and gather the information. When Congress met in January, 1936, the Tariff Commission reported it had found that the Senate had no authority under the Tariff Act of 1930 to request the Commission to make an investigation, but that the Commision was making such a study under its own general powers.

At this writing (June, 1936) no report has as yet been issued by the Tariff Commission disclosing its findings. When and if issued they will undoubtedly exercise considerable influence toward the further development of the American pulp and paper industry.

Vancouver Kraft

The affairs of the Vancouver Kraft Company of Port Mellon, B. C., are gradually being straightened out. Bondholders have agreed to a reorganization plan and at the present it remains for Mr. F. W. Leadbetter to raise the necessary money for completing the rebuilding of the mill through a bond and preferred stock issue against the California-Oregon Paper Mills of Los Angeles, before Vancouver Kraft becomes an operating company.

Projected Mills

During 1935 the Canadian-American Pulp & Paper Mills, Limited, was formed in British Columbia, with the announced purpose of immediately building a bleached sulphite pulp mill at Prince Rupert, B. C. At the present time the organization is still in the financing stage and no information is available as to the date upon which actual construction will begin.

Two other British Columbia projects have been reported in this journal dur-

PACIFIC COAST PULP IMPORTS
1935
(Short Tons)

Customs District	Unbleached Sulphite	Bleached Sulphite	Unbleached Sulphate	Bleached Sulphate	Groundwood Unbleached	Groundwood Bleached	Totals
Los Angeles	8,166	3,451	3,162	110	200	1,536	16,625
San Francisco	5,360	------	294	------	------	------	5,654
Washington	1,107	5,988	------	------	35	------	7,130
Oregon	------	------	7,523	------	------	100	7,623
Totals	**14,633**	**9,439**	**10,979**	**110**	**235**	**1,636**	**37,032**

Source: U. S. Department of Commerce, Bureau of Foreign & Domestic Commerce.

PACIFIC COAST PAPER IMPORTS
1935
(Short Tons)

Customs District	Newsprint	Grease Proof & Waterproof	Kraft Wrapping	Other Wrappings	Totals
San Diego	4,876	----	------	----	4,876
Los Angeles	40,226	3	272	10	40,511
San Francisco	48,735	4	38	----	48,777
Oregon	------	----	------	----	------
Washington	56,833	----	------	----	56,833
Alaska	21	----	------	----	21
Totals	**150,691**	**7**	**310**	**10**	**151,018**

Source: U. S. Department of Commerce, Bureau of Foreign & Domestic Commerce.

ing the past year, the Meehan project and the Dai Thomas project. Neither project has as yet reached the construction stage.

Several other projected mills have been mentioned privately but no public announcements have been made.

Pulpwood Consumption and Prices

The American Paper & Pulp Association estimates in its January, 1936, monthly review that domestic pulp mills consumed approximately 7,500,000 cords of pulpwood in 1935, or about 10 per cent more than in 1934. Only in 1929 was this total of pulpwood consumed exceeded, when the total was 7,645,011 cords.

Imports of pulpwood, according to U. S. Department of Commerce figures taken from the customs records, were 1,037,332 cords, a 6.5 per cent increase over the 973,978 cords imported in 1934.

Domestic wood used for pulp making in 1935 totalled 6,462,668 cords as compared with 5,969,633 cords in 1934, an increase of 493,035 cords or 8 per cent.

The American Paper & Pulp Association's statement concerning the pulpwood situation says, in part:

"The surveys made by the association indicate that the largest gains in pulpwood consumption in 1935 as compared with 1934 were made in the South, in the Pacific Coast States, in the New England States and in Wisconsin, in the order named. . . .

"Imported pulpwood represents 13.6 per cent of the total consumption in 1935 as compared with 14.3 per cent in 1934. The proportion of imported pulpwood to the national total has been decreasing steadily in recent years; but it has tended to increase in New England and in the Lake States where water shipments can be made at low cost. . . .

"These figures substantiate the trends indicated by delivered prices. They show that consumption is increasing in the low cost regions more rapidly than in the high cost regions and that the regions accessible at low freight charges to imported wood are drawing more heavily upon imports. In the high cost regions, consumption of both domestic and imported wood is rapidly decreasing.

"These facts indicate that the movement toward regional balance in pulpwood prices is likely to be sustained because the competition for wood in the high price regions is tending to decrease as consumption decreases. Over a long period of time, irrespective of qualities of pulp that can be made from wood in the different regions, these economic forces are bound to continue and substantial increases in pulpwood prices must depend upon price conditions in the low cost regions, in the South and in the Pacific Coast States."

Pulpwood prices are shown in the graph which accompanies this article. The graph is reproduced from the American Paper & Pulp Association's monthly review for January, 1936, with acknowledgement.

Timber Growth Rate

In the March, 1936, issue of PACIFIC PULP & PAPER INDUSTRY was published a paper prepared by Mr. David E. Hervey of the U. S. Forest Service for presentation at the annual TAPPI meeting in New York in February, Mr. Hervey's paper was entitled "Comparing the Growth Rate of Southeast Georgia Pine and Pacific Coast Hemlock and Spruce."

Mr. Hervey found that the annual growth rate per acre was over 2.1 times

UNITED STATES

Wood Pulp Imports by Grades and Countries of Origin—1935

SHORT TONS

Grade—	COUNTRY OF ORIGIN						Total by Grades
	Canada	Finland	Germany	Norway	Sweden	Others	
Mechanical Wood Pulp—Total	136,112	24,490	.....	7,006	22,404	29	190,041
Unbleached	136,048	22,143	.....	3,317	10,666	29	172,203
Bleached	64	2,347	.....	3,689	11,738	.....	17,388
Sulphite—Total	293,177	175,716	80,255	68,946	446,577	57,798	1,122,449
Unbleached	67,404	146,166	50,024	16,539	377,320	35,573	693,026
Bleached	225,773	29,550	30,231	52,407	69,237	22,225	429,423
Sulphate—Total	94,748	66,286	.....	17,356	429,916	3,036	611,342
Unbleached	43,549	62,173	.....	17,328	400,654	2,980	525,684
Bleached	51,199	4,113	.....	28	29,262	56	84,658
All Others	9,587	.....	.....	.....	25	187	9,799
Total (By Countries)	**533,624**	**266,492**	**80,255**	**93,308**	**898,902**	**61,050**	**1,933,631**
Value	**$22,508,650**	**$8,890,747**	**$3,096,673**	**$3,837,380**	**$30,201,562**	**$2,145,975**	**$70,680,987**

Source—Import Statistics, U. S. Department of Commerce.

greater on the Pacific Coast than in Southeast Georgia. It is recognized by authorities that this rate is conservative and that in practical forestry the Pacific Coast growth rate would be closer to 4 times greater than in Southeast Georgia.

Education

Several of the Pacific Coast pulp and paper mills maintain yearly schools. Probably the most comprehensive course in pulp and paper manufacturing is offered to employees by the Crown Willamette Paper Company at Camas, Washington. The school year 1935-1936 witnessed the enlargement of the Camas school to a three year course.

The Rainier Pulp & Paper Company of Shelton, Washington, several years ago initiated a course in pulp manufacturing which is offered every fall and winter to employees. The course is now presented for the employees of the Olympic Forest Products Company at Port Angeles, Washington, and also for the employees of the Grays Harbor Pulp & Paper Company at Hoquiam, Washington.

In the spring of 1936 the Longview, Washington, high school offered a public vocational course in pulp and paper manufacturing. Mr. George H. McGregor, technical director of the Pulp Division, Weyerhaeuser Timber Company, is instructor. The course covers in outline form the fundamentals of pulp and paper making.

An Active Year

The year 1935 was one of progress in varied lines for the growing pulp and paper industry on the Pacific Coast. Upon looking back, the progress appears to have been greater than was realized at the time. The industry as a result of work done in 1935, is today producing higher quality pulp and paper. Costs have been reduced to enable the mills to pay more for raw materials and for wages. Taking the industry as a whole, it is ahead of 1934 financially, in debts reduced and in profits made.

Pacific Coast pulp mills have further strengthened their position in the American market with respect to quality. West Coast pulp is today the equal of any and superior to many pulps produced in the eastern part of the country and in foreign countries. Market acceptance has been won by hard work and is being maintained by harder work and by mills that are better equipped today than they were a year ago.

PACIFIC COAST STATES
and British Columbia
Paper Production
(Tons 2,000 lbs.)

State—	1931	1932	1933	1934
Washington	374,765	343,222	381,997	418,115
Oregon	200,065	182,789	197,970	220,684
California	192,273	139,297	167,033	169,709
British Columbia	244,397	228,075	260,599	294,183
Total Coast Production	1,011,500	893,383	1,007,599	1,102,691

Bureau of the Census, Dept. of Commerce.

PULPWOOD IMPORTS
(Unit: 1 Cord—128 Cu. Ft.)

	Rough	Peeled	Rossed	Total
1935	99,659	937,248	425	1,037,332
1934	180,019	789,158	4,801	973,978
1933	119,852	591,812	11,544	723,208
1932	114,366	531,158	2,664	648,188
1931	186,613	817,926	17,128	1,021,667
1930	331,158	1,234,678	16,365	1,582,201

Source: Department of Commerce, Bureau of Foreign and Domestic Commerce.

BRITISH COLUMBIA
Pulp and Paper Exports
From All British Columbia Ports
(Compiled by Vancouver Merchants' Exchange—Short Tons)

Destination—	1927	1928	1929	1930	1931	1932	1933	1934	1935
Australia	18,226	14,550	21,480	15,940	11,835	15,314	14,685	26,053	26,026
Argentine	.....	34,045	.....	609	.....*	19,752	28,604	3,985	.....
Central and South America	.....	1,667	14,677	16,503	22,637	6,404	12,693	7,314	2,867
Canada (Eastern ports)	.....	.....	2,130	4,339	4,457	3,820	4,620	24,800	27,677
China	80	35	1,870	2,620	489	16,105	26,494	40,062	3,281
Japan	53,244	57,230	45,526	54,865	78,631	59,959	100,257	93,212	155,530
New Zealand	8,702	20,548	9,525	9,214	5,363	4,251	4,254	2,845	3,206
United Kingdom	.....	.....	1,728	621	9,047	486	347	6,953	4,164
United States	152,002	172,017	156,788	174,017	157,943	130,771	117,733	128,224	123,343
Other Countries	1,980	1,119	277	90	458	731	4,984	11,611	4,989
Total Short Tons	243,671	301,211	254,001	278,818	290,860	257,724†	314,671	345,059	351,083

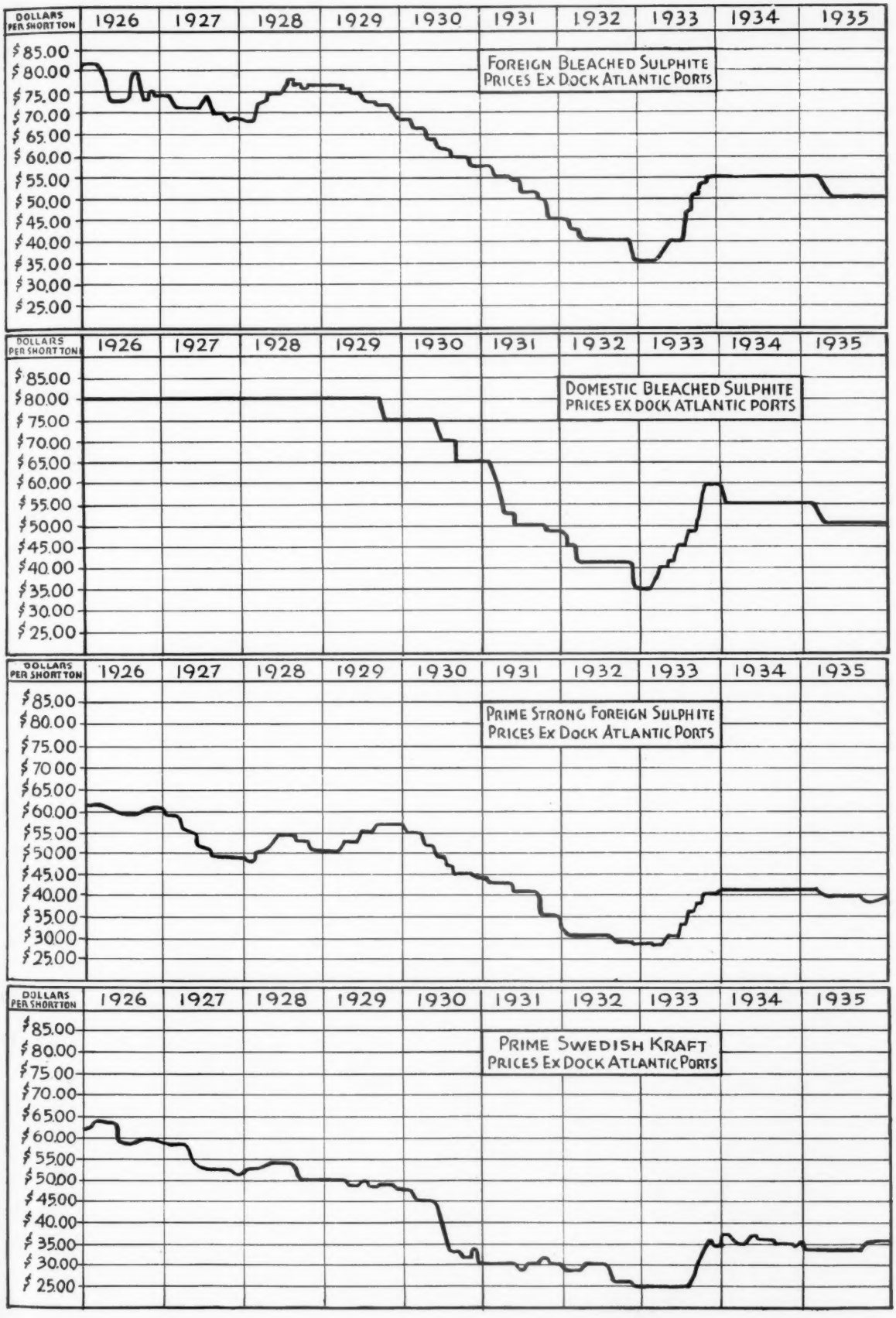
*Argentine shipments in 1931 and 1935 are included under Central and South America.
†Includes 131 tons of paper shipped from New Westminster, destination not available.

U. S. PAPER PRODUCTION—1933-1935*
(Tons of 2,000 lbs.)

	1933	1934	1935
Total—All Grades	**9,190,017**	**9,186,226**	**10,307,000**
Newsprint	928,332	989,705	939,000
Book papers	1,080,196	1,055,247	1,194,000
Paperboard	4,076,290	4,073,309	4,693,000
Wrapping	1,440,029	1,357,438	1,570,000
Writing	478,356	414,542	480,500
Cover	12,697	17,011	20,500
Tissue	406,760	398,770	425,000
Absorbent	79,832	78,953	85,000
Building	328,275	327,866	426,000
All Other	359,250	473,385	474,000

*Bureau of Census, U. S. Department of Commerce, Census of Manufacturers for 1933 and 1934 data. 1935 estimates by the American Paper and Pulp Association.

WOOD PULP PRICE TRENDS 1926-1935



News Print Data

New High Record in World Production

A new high record of world news print production was established in 1935 with 7,628,000 short tons, according to Mr. R. S. Kellogg, secretary of the News Print Service Bureau. This was 286,000 tons or approximately 4 per cent more than in 1934, which in turn was slightly greater than the previous world record of 7,319,000 tons in 1929.

Canada made 36 per cent of the world production of news print last year, Great Britain 13 per cent and the United States 12 per cent. Germany contributed 6 per cent, Japan and France each 5 per cent, Newfoundland, Finland and Sweden each 4 per cent, with smaller amounts from other countries.

The Canadian output of 2,753,000 tons of news print in 1935 was 154,000 tons more than output in 1934 and also 24,000 tons more than the previous high record established in 1929.

The 970,000 tons of news print made in Great Britain in 1935 was also a new high record and 30,000 tons more than the production of news print in that country in 1934. For the first time Great Britain came into second place among the news print countries of the world, exceeding by 58,000 tons the quantity of news print made in the United States in 1935. The news print output in the United States has been decreasing heavily for several years and while there was a falling off of only 45,000 tons from 1934 to 1935, the output in the latter year was 574,000 tons under that of 1927 and still more below the peak year of 1926.

News print production in Germany in 1935 was 18,000 tons more than in the previous year, but still much under 1931 and preceding years. A new high news print record was established in Japan with 368,000 tons of news print produced last year, a gain of 24,000 tons over 1934 and of 100,000 tons since 1928. Japan and France changed places in news print ranking last year with Japan going 10,000 tons ahead of France, whereas in 1934 France was 9,000 tons ahead of Japan. Production of news print in France is now nearly three times as much as in 1927.

Newfoundland also made a new record in news print production in 1935 with 336,000 tons or 7,000 tons more than her closest competitor, Finland. News print production in Finland has shown a consistent record of yearly increases from the 200,000 tons attained in 1927. Production of news print in Sweden in 1935 was 298,000 tons, a gain of 26,000 tons over the preceding year and of 23,000 tons over the previous high record in 1929. Norwegian news print production in 1935 was 182,000 tons or 27,000 tons more than in 1934, but still below the output in several preceding years.

Only during the past wto years have authentic reports upon Russian production been available. They totaled 190,000 tons in 1934 and 193,000 tons in 1935.

There have been no large changes in news print production of the other smaller countries except that Italy, Spain and Poland have substantially increased since 1927, while news print production in Estonia and Denmark has almost disappeared.

NEWSPRINT IMPORTS FROM FINLAND GAIN

The trend of Finnish newsprint exports to the United States is decidedly upward. Last year exports to the United States amounted to about 60,000 metric tons and it is anticipated that they will reach 100,000 tons in 1936, according to U.S. Consul Archibald E. Gray, of Helsingfors.

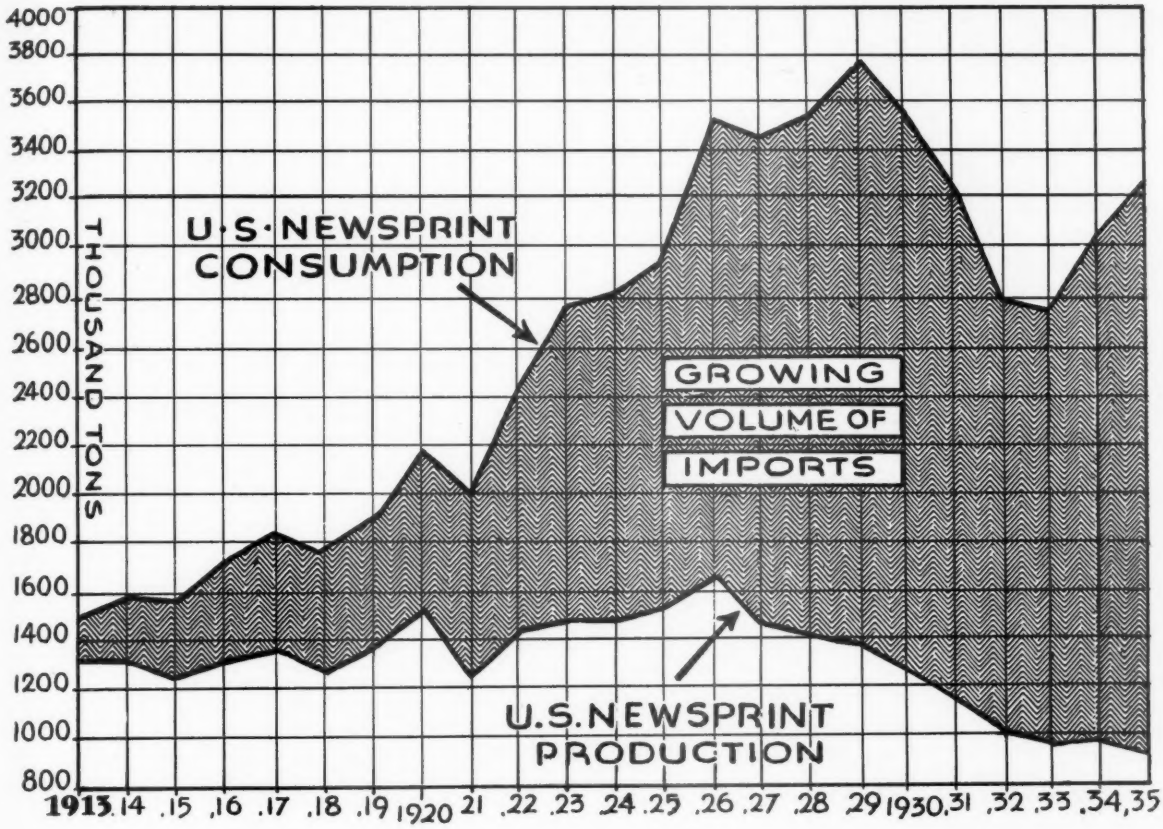
In this connection, a recent issue of The Finnish Paper and Timber Journal reported that large orders have been placed for Finnish newsprint by a representative of one of the leading newspaper chains in the United States, the order which this group placed last year having proved entirely satisfactory.

The Decline of News Print Production in the United States From 1915 to 1935

The graphs below, which represent the total news print consumption in the United States for the years indicated, show the decline in twenty years of the United States producers' share of the domestic market, together with the present dependence upon imports for nearly three-quarters of the news print consumed in this country.

Imports of foreign news print will very likely increase in the next few years due to expanding consumption and to further curtailment of news print production by United States mills who are going to higher grades.

1915 1925 1935



SOURCES OF NEWS PRINT USED IN THE UNITED STATES

(Tons in Round Numbers)

Source: News Print Service Bureau

	U. S. Production	U. S. Exports	Imports into the U. S. From Canada	Newfoundland	Europe	Available for Consumption
1913	1,305,000	43,000	219,000	----------	1,000	1,482,000
1914	1,313,000	61,000	310,000	----------	5,000	1,567,000
1915	1,239,000	55,000	367,000	----------	1,000	1,552,000
1916	1,315,000	76,000	468,000	----------	----------	1,707,000
1917	1,359,000	94,000	558,000	----------	1,000	1,824,000
1918	1,260,000	97,000	596,000	----------	----------	1,759,000
1919	1,375,000	111,000	628,000	----------	3,000	1,895,000
1920	1,512,000	49,000	679,000	1,000	50,000	2,193,000
1921	1,225,000	17,000	657,000	----------	135,000	2,000,000
1922	1,448,000	26,000	896,000	----------	133,000	2,451,000
1923	1,485,000	16,000	1,109,000	----------	200,000	2,778,000
1924	1,481,000	17,000	1,197,000	4,000	156,000	2,821,000
1925	1,530,000	23,000	1,295,000	20,000	133,000	2,955,000
1926	1,684,000	19,000	1,658,000	94,000	100,000	3,517,000
1927	1,486,000	12,000	1,776,000	89,000	122,000	3,461,000
1928	1,418,000	11,000	1,926,000	114,000	116,000	3,563,000
1929	1,392,000	19,000	2,195,000	132,000	96,000	3,796,000
1930	1,282,000	10,000	1,989,000	156,000	134,000	3,551,000
1931	1,157,000	10,000	1,754,000	160,000	151,000	3,212,000
1932	1,009,000	8,000	1,533,000	114,000	144,000	2,793,000
1933	946,000	11,000	1,545,000	95,000	153,000	2,728,000
1934	961,000	23,000	1,956,000	107,000	147,000	3,148,000
1935	912,000	23,000	2,062,000	124,000	197,000	3,272,000

PULP AND PAPER CAPACITIES OF PACIFIC COAST MILLS

Showing principal grades manufactured and capacities in tons per 24-hour day

Name of Mill	Location	—PULP—					—PAPER—						REMARKS
		Mechanical	Unbleached Sulphite	Bleached Sulphite	Sulphate	Soda	News	Sulphites	Sulphates	Book	Board	Others	
BRITISH COLUMBIA													
British Columbia Pulp & Paper Co.	Woodfibre		150										
British Columbia Pulp & Paper Co.	Swanson Bay		(40)										Mill Idle.
British Columbia Pulp & Paper Co.	Port Alice			130									
Canadian Forest Products, Ltd.	Beaver Cove				(40)								Mill Idle.
Pacific Mills, Ltd.	Ocean Falls	195	65		55		230	15	65				News, Kraft and Sulphite Wrapping, fruit wrap, tissues, etc.
Powell River Co., Ltd.	Powell River	475	155				650						Newsprint.
Sidney Roofing & Paper Co.	Victoria	10									25		Roofing and boards.
Vancouver Kraft Mills, Ltd.	Port Mellon				(85)								Construction temporarily suspended.
Westminster Paper Mills, Ltd.	New Westminster							25					Kraft and sulphite wrapping; second sheets; fruit wraps; tissues; specialties.
WASHINGTON													
Berkheimer Mfg. Co., J. E.	Tacoma											8	Rag roofing, etc.
Columbia River Paper Mills	Vancouver	30	110					130					Unbleached sulphite and groundwood wrapping; newsprint; fruit wraps; tissues.
Crown Willamette Paper Co.	Camas	90	200	100	135			390	110	65		25	Manila, wrapping, bag, tissue, kraft, M. F. Book, etc.
Everett Pulp & Paper Co.	Everett					50				65			Book, railroad, writing, school supplies,
Everett Pulp & Paper Co. (Successors to Cascade Paper Co.)	West Tacoma					(25)				(50)			Mill idle.
Fibreboard Products, Inc.	Port Angeles	30	54								75		Box and container board, pulp board. White patent coated board, bottle cap bd.
Fibreboard Products, Inc.	Sumner										75		Box and container board, coated board.
Grays Harbor Corporation	Hoquiam							50					Sulphite bonds, writing, specialties.
Grays Harbor Pulp & Paper Co.	Hoquiam			220									
Inland Empire Paper Co.	Millwood	100	33				65	50					News, wrapping, poster, sulphite specialties, etc.
Longview Fibre Co.	Longview	75			130				75		150		Board, wrapping, bags, container, boxes.
National Paper Products Co.	Port Townsend				250				235				Kraft liner board, wrapping, bag paper.
Olympic Forest Products Co.	Port Angeles			200									
Pacific Coast Paper Mills	Bellingham							15					Toilet Tissues, etc.
Pacific Straw Paper & Board Co.	Longview	30									52		All kinds of boards.
Rainier Pulp & Paper Co.	Shelton			185									
Soundview Pulp Co.	Everett			200									
Puget Sound Pulp & Timber Co., Fidalgo Division	Anacortes		80										
Puget Sound Pulp & Timber Co., San Juan Division	Bellingham		100										
Shaffer Pulp Co.	Tacoma		65										
St. Regis Kraft Co.	Tacoma				180								
Tumwater Paper Mills Co.	Tumwater	(20)						(50)					Mill idle.
Washington Pulp & Paper Corporation	Port Angeles	260	75				315						Newsprint.
Weyerhaeuser Timber Co.	Longview			200									
Weyerhaeuser Timber Co.	Everett		150										

Weyerhaeuser Timber Co.	Longview			200										Newsprint.
Weyerhaeuser Timber Co.	Everett		150											
OREGON														
Crown Willamette Paper Co.	Lebanon		35					35						Wrapping, cartridge, powder and semi-parchmentized wrappings.
Crown Willamette Paper Co.	Oregon City	60												
Crown Willamette Paper Co.	West Linn	377	90				350	23						News, Wrapping, Poster, Sulphite specialties.
Fir-Tex Insulating Board Co.	St. Helens												*	Wood fibre insulating board. Daily capacity 250,000 sq. ft.
Hawley Pulp & Paper Co.	Oregon City	170	85				135	90						News, Sulphite Wrapping, Lightweight Papers, Tissue, Cover, etc.
Oregon Pulp & Paper Co.	Salem		20	100				120						Sulphite Bonds, Glassine, Greaseproof.
St. Helens Pulp & Paper Co.	St. Helens				115				120					Kraft wrapping, bag, fruit wraps, towels,
Coos Bay Pulp Corporation	Empire		70											
Spaulding Pulp & Paper Co.	Newberg		90											
CALIFORNIA														
California Fruit Wrapping Mills	Pomona							25						Fruit wraps, wrapping, tissues, napkins,
California-Oregon Paper Mills	Los Angeles							40						Wrapping, fruit wrap, vegetable parchment, tissues.
Certain-teed Products Corp.	Richmond												38	Roofing, felts, mulching and insulating papers.
Crown Willamette Paper Co.	Floriston													Dismantled.
Fibreboard Products	Los Angeles (Vernon Div.)											110		Box board, container, patent coated board, bristol, bottle cap, etc.
Fibreboard Products	Stockton											250		Boxes, cartons, cardboard specialties.
Fibreboard Products	Los Angeles (Sunset Div.)											8		Binder board and miscellaneous board.
Fibreboard Products	Antioch											200		Container board, tag, white patent coated, folding and set-up corrugated straw.
Lloyd A. Fry Roofing Co.	Compton												15	Asphalt Roofing, Roofing Felts.
Johns-Manville Corporation	Pittsburg												30	Asbestos Paper.
Los Angeles Paper Manufacturing Co.	Los Angeles												33	Roofing, car lining, industrial flooring.
Paraffine Cos., Inc.	Emeryville												100	Roofing and felts, floor coverings.
Pioneer Flintkote Co.	Los Angeles												70	Roofing felts and boards, patent coated board.
COLORADO														
Central Fibre Products Co. Successors to Colorado Pulp & Paper Co.	Denver	15										50		Box, liner, chip boards, wall boards, etc.
HAWAII														
Olaa Sugar Company	Olaa												28	Mulch Paper (Mill Idle).
Hawaiian Cane Products Co.	Hilo													Insulating board from bagasse. (300,000 sq. ft. ½ in. thick per day).
Total daily capacities		1937	1667	1335	990	75	1745	1058	605	115	995	347		

Total Pulp Capacity—All Grades **6,004**

Total Paper Capacity—All Grades **4,865**

*Totals do not include 250,000 sq. ft. of insulating board.

Total Pacific Canadian Capacity—Pulp, 1,400 tons; Paper, 1,010 tons.

Total Pacific United States Capacity Pulp, 4,984 tons; Paper, 3,855 tons.

YIELD OF SPRUCE-HEMLOCK STANDS IN THE PACIFIC NORTHWEST REVEALED BY FOREST SERVICE GROWTH STUDY

By STANTON B. HAYWARD*

IN response to the increasing demand for information on future supplies of pulpwood timber, a systematic and thorough study of the growth and yield of the Sitka spruce-western hemlock type has been made by the Pacific Northwest Forest Experiment Station. The field and office work involved, which occupied a period of three years, were supervised by Walter H. Meyer, then silviculturist of the station, who recently became professor of forest management in the University of Washington. A report on the study has been prepared and is to be published in a few months as a technical bulletin of the U. S. Department of Agriculture. A digest of the principal findings is offered here for use pending publication of the full report.

The spruce-hemlock type has a range of 1,500 miles from southeastern Alaska through British Columbia, Washington, and Oregon. It is distinctly a fog-belt type, being confined to a fairly narrow strip along the Pacific coast. In the 12 westernmost counties of Oregon and Washington stands of this type occupy an area of some 2 million acres. The volume of Sitka spruce and western hemlock totals approximately 63 billion board feet. A part of this is in stands not of the spruce-hemlock type. The stands in Oregon and Washington are largely even-aged. In British Columbia, the total volume of the two species is made up of about 9.5 million board feet of Sitka spruce, 48 million board feet of western hemlock along the coast, and 11 million board feet of hemlock growing inland. Some of this volume, especially that of hemlock, is in types other than the spruce-hemlock type. There are approximately 1¼ million acres in this type in British Columbia. In Alaska, Sitka spruce and western hemlock together have a gross volume of approximately 74 billion board feet. The stands in both British Columbia and Alaska are mainly old growth and uneven-aged.

The two species occur together in a wide variety of mixtures and also in pure stands. Hemlock often forms dense pure stands, in which the boles are cleaned naturally at a relatively early age and ground cover is almost completely lacking. Where spruce is present, the stand is more open and the crown canopy less complete, and production of clear lumber requires a longer period. By the time a normally stocked stand of hemlock has reached the age of 80 years, about 79 per cent of the number of trees show clear length and the average clear length exceeds 30 per cent of the total tree height. In the Sitka spruce stands studied, the number of trees showing clear length never exceeded 40 per cent and clear length did not average more than 20 per cent of the total tree height, for any age class. Clear length percentages vary widely with density and spacing.

Western hemlock is more tolerant of shade than Sitka spruce; it is able to endure heavy shade for long periods of time and then to respond to release with acceleration in growth. Many a second-growth hemlock stand was established as an understory, was suppressed for many years, and assumed normal growth as soon as the overstory was removed. Evidence of this is the density of the annual rings at the centers of rapid-growing vigorous hemlocks in many well-stocked stands.

Hemlock and spruce are both shallow-rooted and hence susceptible of windthrow. Sitka spruce is less liable to damage by insects and fungi. Fallen trees of both species decay rapidly and form a deep layer of rotted wood beneath many stands. The hummocky terrain often observed gives ample evidence of extensive windfall damage in the past.

Data for this study were gathered from 658 sample plots covering as well as possible the range of age and site conditions. The 294 plots in Oregon and Washington were measured by field parties from the Pacific Northwest Forest Experiment Station during the field seasons of 1933 and 1934. The Alaska data, from 300 plots, and the British Columbia data, from 64 plots, were gathered in connection with studies previously made by local forest officers of those regions and loaned for use in this study.

This project was limited to the study of immature stands in the coastal region. In Oregon and Washington, few hemlock stands more than 90 years old were found to meet the requirements of the study. At what age the stands normally begin to deteriorate, owing to losses from decay, insect attack, and other factors, is not known. There are thousands upon thousands of acres of healthy, well developed, fully stocked hemlock stands of all ages up to 90 years; but second-growth stands beyond that age are only remnants, usually understocked, poorly developed, and unhealthy.

The Sitka spruce - western hemlock type is one of the most productive timber types of the United States, both as to quantity and as to quality. Its yield

A vigorous 86-year-old stand of western hemlock and Sitka spruce on the Cascade Head Experimental Forest near Otis, Oregon. A fully stocked acre-plot in this stand has 207 living trees, averaging 18.7 inches in diameter, with a basal area of 395 square feet, and a volume of 20,543 cubic feet, or 117,457 board feet Scribner rule.

*Pacific Northwest Forest Experiment Station, Portland, Oregon.

is superior to that of the Douglas fir type. On areas for which the spruce-hemlock site index* is 150, an index that is common and that is slightly exceeded by the Douglas fir site index for the same areas, spruce-hemlock yields exceed those of Douglas fir by about 30 to 50 percent, increasing with age within that range, and in Scribner board feet by about 66 to 70 percent in stands more than 80 years old. These differences are due mainly to the fact that spruce and hemlock are more tolerant of shade and produce more growing trees per acre than does Douglas fir, and hence, site class for site class, the yield capacity of the spruce-hemlock type is greater than that of the Douglas fir type.

On individual fully stocked areas selected from pure spruce stands in the vicinity of Winchester Bay, Oregon, gross volumes as high as 45,000 cubic feet, or 310,000 board feet Scribner rule, have been produced in 173 years. Well-stocked acre plots in pure hemlock stands in Wahkiakum and Grays Harbor Counties, Washington, have a gross scale of from 22,000 to 25,000 cubic feet, or 127,000 to 151,000 board feet Scribner rule, at from 90 to 94 years. These plots are considerably above the average for the study.

On land of site index 140, which is common for the type, a normal stand of spruce and hemlock will produce 18,900 cubic feet, 198 cords, or 104,000 board feet Scribner rule, per acre in 100 years. At that time the average yearly growth during the life of the stand will be 189 cubic feet, or 1,040 board feet Scribner rule, per acre. This is called the mean annual increment and is derived by dividing the total volume produced at a certain age by the length of time in years it took to grow that total volume.

The yield of even-aged stands is influenced principally by site quality, age, density of stocking, and stand composition. The yield tables compiled in this study show the variations in yield corresponding to differences in site quality and age only. Density of stocking was eliminated as a variable factor in the basic data by selecting plots in fully stocked stands only. The factor of stand composition was disposed of by including samples of all degrees of species mixture. The yield tables therefore represent the average species mixture of the average normal stands found in the region. Tables are given in the complete report showing the effects of variations in composition and density on the yield of normal stands.

The range in site indices shown by figure 1, from site index 60 to site index 200, was found to represent practically all the site conditions existing within the range of the type except those under which timber production is impracticable.

Table 1, giving the normal basal area in square feet per acre of trees 2.6 inches and more in diameter, by age and site index, will be found useful in applying Table 2, which gives the normal cubic volume per acre of trees of that diameter range, by age and site index. From Table 3, which gives the mean annual increment of normal stands in cubic feet per acre, it will be seen that the rotation age is close to 70 years, as

*Site index is the height, in feet, of the average dominant and codominant trees at the age of 100 years, used as an indicator of site quality. "Site index 150," for instance, means that the dominant and codominant trees on the area referred to average, have averaged, or will average 150 feet in height at 100 years.

TABLE 1

Basal area per acre of trees 2.6 inches and more in diameter.

Age (years)	Basal area in square feet per acre, by site index							
	60	80	100	120	140	160	180	200
20	.....	61	90	111	130	138	144	149
40	156	184	204	220	234	247	258	271
60	211	230	250	270	290	308	324	338
80	235	257	278	301	324	343	361	376
100	251	274	297	322	345	367	385	402
120	261	286	310	336	360	382	401	419
140	270	296	320	347	372	395	415	433
160	278	304	330	357	383	407	427	446
180	285	311	338	366	392	417	437	456
200	290	317	344	373	400	425	445	465

TABLE 2

Cubic-foot volume per acre, including stump and tip but not bark, of trees 2.6 inches and more in diameter

Age (years)	Volume in cubic feet per acre, by site index							
	60	80	100	120	140	160	180	200
20	.....	400	800	1,200	1,600	2,000	2,200	2,600
40	2,100	2,900	3,900	5,300	6,800	8,100	9,200	10,200
60	3,900	5,300	7,100	9,300	11,800	14,200	16,000	17,700
80	5,200	7,100	9,500	12,400	15,800	19,000	21,500	23,800
100	6,300	8,400	11,300	14,800	18,900	22,600	25,600	28,300
120	7,100	9,500	12,700	16,700	21,300	25,500	28,900	31,900
140	7,700	10,400	13,900	18,200	23,200	27,800	31,500	34,800
160	8,300	11,200	14,900	19,600	24,900	29,800	33,800	37,300
180	8,700	11,800	15,800	20,800	26,400	31,600	35,800	39,600
200	9,100	12,400	16,600	21,800	27,800	33,200	37,700	41,700

TABLE 3

Mean annual cubic-foot increment per acre of trees 2.6 inches and more in diameter.

Age (years)	Increment in cubic feet per acre, by site index							
	60	80	100	120	140	160	180	200
20	.....	20	40	60	80	100	110	130
40	52	72	98	132	170	202	230	255
60	65	87	118	155	197	237	267	295
80	65	89	119	155	198	238	269	298
100	63	84	113	148	189	226	256	283
120	59	79	106	139	177	212	241	266
140	55	74	99	130	166	199	225	249
160	52	70	93	122	156	186	211	233
180	48	66	88	116	147	176	199	220
200	46	62	83	109	139	166	188	208

TABLE 4

Number of trees per acre 11.6 inches and more in diameter.

Age (years)	Number of trees per acre, by site index							
	60	80	100	120	140	160	180	200
40	.....	.....	7	26	52	83	114	142
60	7	31	66	110	158	175	162	133
80	38	72	117	163	180	162	127	98
100	68	108	155	183	167	134	101	77
120	95	138	175	179	144	110	83	62
140	119	159	182	164	124	93	70	52
160	138	171	179	148	108	79	61	45
180	152	177	170	133	96	71	54	39
200	161	178	158	119	87	63	49	35

TABLE 5

Board-foot volume[1] per acre, by Scribner rule (applied to 16-foot logs), of trees 11.6 inches and more in diameter.

Age (years)	Volume in board feet[2] per acre, by site index							
	60	80	100	120	140	160	180	200
40	.....	.....	500	2,500	7,000	16,000	25,500	35,500
60	500	3,000	9,500	23,000	44,500	66,500	86,500	104,000
80	3,500	10,500	24,000	47,500	78,000	105,000	129,500	149,500
100	9,000	20,000	39,500	69,000	104,000	134,000	161,000	184,000
120	15,000	29,500	53,500	86,500	124,500	157,500	186,000	211,500
140	21,000	38,500	65,500	101,000	141,000	177,000	207,000	234,000
160	26,500	46,500	76,000	113,500	155,500	193,000	225,000	253,000
180	31,500	53,500	85,000	123,500	167,500	207,000	240,500	270,000
200	36,000	60,000	93,000	133,000	178,500	220,000	255,000	285,500

[1] To an 8-inch top inside bark, exclusive of a 2-foot stump.
[2] Values rounded off to nearest 500.

the mean annual increment reaches a peak between 60 and 80 years.

Table 4, giving the number of trees per acre 11.6 inches and more in diameter, will be found useful in applying to actual stands the Scribner volume yield values given in Table 5 for trees 11.6 inches and more in diameter scaled in 16-foot logs to an 8-inch top diameter. Table 6 gives the mean annual increment of normal stands in board feet Scribner rule per acre. This table shows that rotation ages vary according to site index class, being 160, 130, 110, and 100 years for site indices 100, 120, 140, and 160, respectively, as the mean annual increments reach their peaks close to those ages for the several site index classes.

Table 7 gives the volume per acre in cords of trees 11.6 inches and more in diameter, by age and site index. The values are standard cords (4 by 4 by 8 feet) of stacked wood, usually split and peeled. The conversion factor used is based on present utilization practice.

The yield tables in this study can be applied directly only to normal stands. Many stands are below normal in stocking and volume production. In order to use the tables a thorough knowledge of the stand is requisite. A forest survey must be made to obtain data on the acreages of the various age and site classes, density of stocking, and species composition. The more extensive the area the more intensive and detailed is the survey data required. On a small area, uniform as to site quality and as to age, stocking, and stand composition, a quick field examination would give all the data needed to predict yield.

When age, site class, degree of stocking, and species composition have been summarized by acreages, prediction of future yields can be made by applying the proper normality percentages to the normal yield tables. Total basal area per acre is used as an indication of stocking normality in predicting total cubic volume production. For predicting total Scribner volume, number of trees 11.6 inches and more in diameter is a more reliable indicator. To determine possible cubic volume production, the ratio between actual and normal basal area is applied to the cubic-volume yield-table values as a correction factor.

The application of the normal yield tables will be illustrated here by an example in which it is desired to find out the yield 40 years hence of a stand now 40 years old, uniform with regard to site quality, density of stocking, and species composition. A survey of the stand has included a diameter tally by species, showing that the spruce and hemlock are nearly equally represented; increment borings, indicating that the total age of the stand is 40 years; and height measurements of dominant and codominant

TABLE 6

Mean annual board-foot increment per acre, by Scribner rule (applied to 16-foot logs) of trees 11.6 inches and more in diameter.

Age (years)	Increment in board feet per acre, by site index							
	60	80	100	120	140	160	180	200
40	----	----	12	62	175	400	638	888
60	8	50	158	383	742	1109	1442	1734
80	44	131	300	594	975	1312	1619	1869
100	90	200	395	690	1040	1340	1610	1840
120	125	246	446	721	1037	1312	1550	1762
140	150	275	468	721	1007	1264	1479	1671
160	166	291	475	709	972	1206	1406	1581
180	175	297	472	686	931	1150	1336	1500
200	180	300	465	665	892	1100	1275	1428

TABLE 7

Volume per acre in cords of trees 11.6 inches and more in diameter.

Age (years)	Volume (in cords) per acre, by site index							
	60	80	100	120	140	160	180	200
40	----	----	1	6	17	36	55	74
60	1	7	22	49	87	125	157	181
80	8	24	53	95	145	189	220	248
100	21	44	83	134	187	232	265	295
120	33	63	108	163	217	264	301	333
140	46	80	128	184	240	290	329	364
160	56	94	144	200	259	311	353	390
180	66	106	158	214	275	330	374	414
200	73	117	168	227	289	347	394	436

Pulpwood Cutting in a Fine Western Hemlock Stand, Grays Harbor County, Washington

trees, which give an average of 83 feet. By use of Figure 1, the site index is found to be 160. Stand tallies show that the average basal area per acre is 230 square feet and that there are 75 trees over 11.6 inches in diameter per acre.

Normal basal area per acre at 40 years for site index 160 is found by reference to Table 1 to be 247 square feet. The actual value shown by the stand tally, 230 square feet, divided by the normal value, gives the normality percentage 93. From Table 2 it is seen that for site index 160 the normal cubic volume at the age of 80 years is 19,000 feet. Thus for the 40-year-old stand in the example the actual possible yield 40 years from now is 93 percent of 19,000 cubic feet, or 17,670 cubic feet per acre.

In determining actual possible Scribner board-foot yield for this stand, the ratio between the actual number of trees per acre 11.6 inches and more in diameter and the normal number of trees per acre of that size is applied to the normal Scribner volume as a correction factor. The normal number of trees per acre for site index 160 and age 40 is found from Table 4 to be 83. The actual number as determined through the tally, 75, divided by the yield-table value, 83, gives the normality percentage 90. The normal Scribner yield per acre at 80 years for site index 160 is found in Table 5 to be 105,000 board feet. Thus the actual yield per acre realizable from this stand 40 years from now is 90 percent of 105,000, or 94,500 board feet, Scribner rule.

The site-index curves were based on hemlock heights as far as possible, this species predominating in the stands studied. Where spruce predominates in the stand and site index is determined by measuring dominant spruce heights, a correction may be necessary to arrive at the proper site index before using the yield tables. It was found that in mixed stands more than 45 years old, the average height of the dominant spruce exceeds that of the dominant hemlock by an average of 7 feet. In stands less than 45 years old the average dominant spruce measured only 3 to 4 feet more than the average dominant hemlock. Where the average heights ranged from 30 to 50 feet, no appreciable difference in the heights of the two species was noted. For example, if the average dominant spruce in a 60-year-old stand is found to measure 107 feet, the height to be used as the site index is 100 feet. From Figure 1, the proper site index is then 137, instead of 147 as it would have been if based on average dominant spruce height alone.

The normal yield table values should be further corrected when applied to pure or nearly pure stands of either spruce or hemlock. A slight addition to the normal values should be made in the case of stands containing 90 percent or more spruce, and a slight deduction for stands containing 90 percent or more hemlock.

The normal yield tables give gross volumes, without allowance for cull. Reduction to net values must be made on the basis of the cruiser's estimates. Deduction for defect is usually expressed as a single percentage including all the kinds of defect present. Young even-aged stands of Sitka spruce and western hemlock, when undamaged by fire, logging, or wind, are prevailingly sound and healthy. No deduction for defect is necessary in that case.

This digest is of necessity incomplete. In the full report there are 70 tables and 22 charts. Included in the wealth of information in the complete manuscript are a normal yield table series including tables of basal area, number of trees, average diameter, cubic volume, Scribner board-foot volume, and International board-foot volume; a series of periodic and mean annual increment tables; an analysis of the trend of yield with average diameter; a discussion of the secondary vegetation of the Sitka spruce-western hemlock forests of Oregon and Washington including the names of species observed and their relative frequency of occurrence; normal mortality tables; a comprehensive discussion of methods of stocking determination; stand tables for number of trees by age and site class; volume tables for various utilization standards for both Sitka spruce and western hemlock; tables giving the distribution of tree volume by log position; and an explanation of the technique used in compiling the data and in constructing the tables.

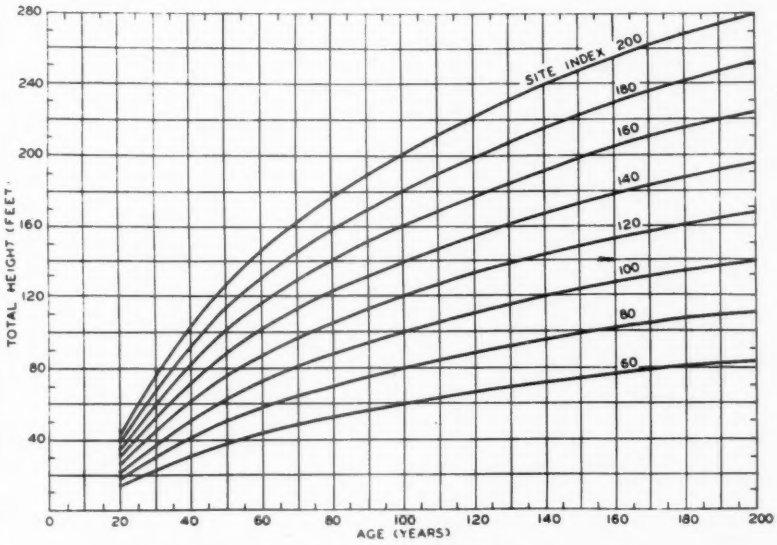


Figure 1. Average total height of dominant and codominant trees.

A 160-year-old pure Sitka spruce stand along the Oregon Coast highway near Winchester Bay. Many thousand acres are covered by such stands in this vicinity. Several yield study plots on this area contained an average of 64 trees per acre, averaging 38.8 inches in diameter, with an average volume of 35,100 cubic feet or 210,800 board feet Scribner rule. The average mean annual increment per acre for these selected plots is now 219 cubic feet or 1,318 board feet Scribner rule, gross scale.

WHY TIMBER SHOULD BE TREATED AS A CROP

Neither employment nor national wealth is increased by "locking up" American forests. On the contrary they are lost by slow growth of young trees and by the rotting of mature timber.

Timber is a renewable crop and will be treated as such if policy is sound. Forests ought to be commercially utilized to permit young growth to grow at the maximum rate the specie, soil and moisture will permit.

By cutting out the older, no longer growing trees, employment and national wealth are increased, and they are likewise increased through the more rapid addition of wood to the forests through the opportunity given the young growth to normally expand.

Silently, the Western hemlock shown in the above photograph, which was cut on the Western side of the Olympic Peninsula in the area tributary to Grays Harbor, tells why Pacific Coast forests should be utilized on a crop basis to increase employment and wealth.

This hemlock is approximately 88 years old. For 76 years it was an understory or suppressed tree, overshadowed by the giant, mature Douglas firs. It received little sunshine and but a small share of the moisture. So it grew but six inches in 76 years.

Then came the memorable storm from the Pacific Ocean, which blew down thousands of old, mature and over-ripe trees. This hemlock emerged unscathed. It now received sunlight and moisture sufficient to permit it to assume the normal growth rate of Western hemlock.

In the succeeding 12 years the tree grew 6 inches, as much as it had grown in the previous 76 years.

But that is only part of the story. It has been computed by forestry authorities that this hemlock at the time of the "blowdown" contained 8 cubic feet of wood. At the time it was cut it contained 23 cubic feet, a remarkable gain of 15 cubic feet in 12 years, or 1.25 cubic feet per year.

In 12 years this tree nearly tripled its cubical content of wood.

A pulp mill would have utilized 81 per cent of the 23 cubic feet at the time the tree was cut, but if it had been cut while it was still a suppressed tree the percentage of utilization would have been much less.

At the time this was an understory tree it was about 70 feet in height. When released from suppression this hemlock grew rapidly in diameter but little in height, this characteristic being a peculiarity of Western hemlock.

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- Crest Veribest Butcher—S. F. Pink

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- Crestex No. 2 Tissue—Unbleached White and Manila

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- Crown Bleached Alfibre Fruit Wrap
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- Crown Copperized Alfibre Fruit Wrap
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- Commander Kraft—Sq.
- Pure Fibre—(Unbleached Sulphite)—Sq.

Gummed Tape—
- Crown Gummed Tape
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- Crown XX Kraft Golden Brown, M. F. Plain
- Crown XX Corduroy Kraft, Brown, M. F. Striped
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- Crown Damask Kraft — Silvertone Gray, M. G. wide stripe
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Mill Wrappings—
- Crown Mill Wrapper

Napkins—
- Embossed, Genuine Crepe, Semi-crepe, Full Bleached Napkins
- Fixture and Special-fold Napkins
- Package Napkins — Full Bleached and colors

Newsprint—
- Standard News (rolls)
- Commander News (sheets)
- Crown Printers Roll News
- Crown Printers Sheet News
- Crown Flat-bed Sheet News
- Crown Pink, Green and Peach News

Odd Bags—
- Crown Merchandise Bags
- Crown Notion Bags
- Crown Millinery Bags
- Crown Garment Bags
- Crown Banana Bags
- Crown Barrel Bags
- Crown Poultry Bags
- Crown Sugar Bags
- Crown Nail Bags
- Crown Confectionery Bags
- Crown Laundry Bags
- Crown Shopping Bags

Roll Toilet Tissue—
- 10-Lb. Fourdrinier Tissue—750-1000 and 2000 count
- 10-Lb. Fourdrinier Tissue—650-750-1000 and 2000 count
- 10-Lb. Fourdrinier Notched Oval Tissue — 400 count — 7 and 8-oz. rolls
- 12-Lb. Full Bleached Tissue—1000 count
- 12-Lb. Unbleached — Semi-crepe—650 count
- 16-Lb. Unbleached — Semi-crepe—4-5-6-7 and 8-oz rolls
- Full Bleached Genuine Water Crepe—6-7-8 oz. rolls
- Semi-Bleached Genuine Water Crepe—6-7-8-oz. rolls

Specialty Bags—Plain and Printed—
- Crown Raisin, Prune, Peach and Fig Bags

Raisin Tray—
- Crown Sunbeam Raisin Tray

Salesbook Manilas—
- Crown Salesbook Manila

Imitation Greaseproof—
- Crown XX Sulpar
- Crest Parchspun

Sulphite Box Liners—
- Crown Water Crepe Box Liners—Pink, Blue and White
- Crown Machine Crepe Box Liners—Pink, Blue and White
- Crown Uncreped Box Liners—Pink, Blue and White

Sulphite Wrapping—
- Crown Manila
- Crown Alfibre
- Crest Alfibre

Tire Wraps—
- Crown Tire Wraps

Waxing Sulphite
- Crown Opaque Bread Wrap
- Crown Bleached Waxing Sulphite

Waxing Tissue—
- Crown Snowtex Waxing Tissue
- Crestex Waxing Tissue

Waxed Papers—
- Crown Waxfibre
- Crest Waxfibre
- Florist Tissue

Waterproof Paper (Laminated)—
- Crown Sealtite Kraft

CROWN WILLAMETTE PAPER CO.
Los Angeles

Products

Self-opening Grocery Bags (Otter Kraft)

Fruit Wraps, plain and printed

CRYSTAL PAPER SERVICE CORP.
Los Angeles

Products

Paper Drinking Cups
Paper Souffle Cups
Paper Food Containers
Water Bottle Caps

HAL DE WAIDE
Portland, Ore.

"Slip Away" Toilet Seat Covers

ENVELOPE MANUFACTURING CO.
Los Angeles

Products

All types of Envelopes

EVERETT PULP & PAPER CO.
Everett, Wash.

Products

Book Papers—
- Machine Finished Book, white, India, yellow, blue, pink, green, orange
- Nautilus M. F. Book, white
- Symphony M. F. Book, white
- Masterpiece Book (25x38-50 and heavier), white
- Super Book, white, India
- Nautilus Super Book, white
- Symphony Super Book, white
- Art Book (English finish), white, India
- Monastery Text (eggshell), white, India
- Nautilus Eggshell, white
- Anchor Book (M. F.), white
- Binnacle Book (M. F.), white
- Super Rotogravure, white
- Soap Wrapper (alkali proof), white
- "Hard-Wear" Catalogue (25x38-40 and heavier), white
- Non-Fading Poster, white, orange

Label and Lithographic Papers—
- Litho Poster, white
- M. F. Label, white
- Super Label, regular, white; tub sized, white

Offset Papers—
- Biplane Book (No. 1 offset) White (Tub Sized)
- Twinphase Book (No. 2 offset) White (Tub Sized)

Writing Papers—
- Railroad Writing (O. P. S.), white, amber, blue, pink, green
- Penmanship Writing (M Grade), white
- No. 4 Opacity Bond, white, canary, buff, blue, pink, green, goldenrod.

Stadium Bond (surface sized), white, canary, buff, blue, pink, green, goldenrod

Mimeograph Papers—
Signwell Mimeo ("152X" hard sized), white wove, blue, pink, canary, buff, green, goldenrod
#3 Mimeo Bond (hard sized)
Anchor Laid Mimeo (slack sized), white
Anchor Wove Mimeo (slack sized or sized), white
Laid Mimeo (slack sized), white

Tablets and Stationery—
Li-Rite Coil Wire-bound Notebooks.
Tablets, Pads, Composition Books, Notebooks and Fillers
Opaque School Papers
Drawing Papers
West Trade Commercial Stationery
Federal Reserve Perforated Pads
West Trade Columnar Pads
Adding Machine Paper

("Everett" brand used where not otherwise noted.)

FIBREBOARD PRODUCTS, Inc.
Port Angeles, Sumner, Wash.
Los Angeles, Stockton, Antioch, Calif.

Products

Boxboards—
Miscellaneous Boxboards

Paper Cans: Tubes—
Paper Cans
Coffee Cans
Drug Cans
"White-Tite" Cans
Double "White-Tite" Cans
Mailing Tubes
Telescope Mailing Tubes
Screw Top Mailing Cases
Kraft Tuck-end Mailing Tubes
Fluted Ice Cream Dishes

Egg Packing—
6x6 Fillers
Egg Cartons, 3x4 and 2x6
"Cushion-Pak" Egg Cartons, 3x4 and 2x6
Egg Case Flats

Corrugated Products—
Corrugated Rolls
Photo Mailers
"Super-Test" Corrugated Shipping Cases
Milk Cases
Coffee Cases
Beer Cases
Wine Cases
Glass Cases
Miscellaneous Cases
Cereal Cases
Butter Cases
Display Stands

Solid Fibre Products—
"Super-Test" Solid Fibre Shipping Cases
Fruit and Vegetable Cases
Cannery Cases
Dried Fruit Cases
Salmon Cases
"Re-file" Cases
Butter Cases
Miscellaneous Cases
Cereal Cases
Soap Cases
Liquor Cases

Pails—
Food Pails
Ice Cream Pails

Commodity Folding Boxes—
Cake Boxes
Cake Circles
Candy Boxes
Florist Boxes
Clothing Boxes
Laundry Boxes
Hat Boxes
Millinery Boxes
Collar Bands

Fruit Packing—
Berry Baskets
Liners—Corrugated and Chip
Pads—Corrugated and Indent
Collars
Fig Trays
Fig Partitions
Fruit Baskets
Peach Shims
Orange Shims
Basket Shims
Shims—Plain and Combination
Basket Circles
Tree Bands
Labels

FIELD-ERNST ENVELOPE CO.
Los Angeles

Products

Printed and Plain Business Envelopes for mailing and filing

FIR-TEX INSULATING BOARD CO.
St. Helens, Ore.

Insulating and Acoustical Board

LLOYD A. FRY ROOFING CO.
Compton, Calif.

Products

Asphalt Roll Roofing
Asphalt Slate Surface Shingles

GATES PAPER CO., LTD.
Los Angeles

Products

Round Fibre Cans
Mailing Tubes of all types

GRAYS HARBOR CORPORATION
Hoquiam, Wash.

Products

Sulphite Bonds
Mimeograph
Manila
Writing
Offset
Specialties

GRAYS HARBOR PULP & PAPER CO.
Hoquiam, Wash.

Products

Bleached Sulphite Pulp

HAWLEY PULP & PAPER CO.
Oregon City, Ore.

Products

Newsprint—
Standard shade and blue white
Rolls and sheets, all grades
Poster Paper
Railroad Manila
Drawing Manila—Standard colors
Sulphite Wrapping—
Cheviot in blue, green, orange, red, brown and gray
Meat wraps in bleached manila and Cheviot colors
Tailors pattern in black and green
Bakers' Manila
Macaroni Papers
Sulphite Screenings
Corrugated Screenings
Deciduous and Soft Fruit Wrappers
Tissue Paper, bleached and unbleached
Cheviot Tissues, blue, green, orange, red and tan
Cover Paper, ten fast-to-light colors
Towels, interfolds and rolls
Grocery Bags
Kraft Wrapping Paper, No. 1 and No. 2

INLAND EMPIRE PAPER CO.
Millwood, Wash.

Products

Newsprint—
Rolls and Sheets
White, cream, colors

High Grade News—
Special halftone and magazine print
No. 1 Colored Poster

Mimeograph News—
Laid and wove
White and six colors
Sub. 16, 20 and 24

Coarse Papers—
Wrappings
Car Linings
Screenings
Ham Wrap
Sheathing

Sulphite and Groundwood Specialties—

THE JAITE COMPANY
Plants: St. Helens, Ore.
Wilmington, Cal.
Offices: San Francisco

Products

Multiwall Sewn Paper Bags

JOHNSON ENVELOPE CO.
San Diego, Calif.

Products

Catalog Envelopes
Expanding Envelopes
File Folders
Filing Envelopes
Mailing Envelopes
Merchandise Envelopes
Photo Mailers
Tag Envelopes

JOHNS-MANVILLE, Inc.
San Francisco

Products

Building Papers—
Asphalt Saturated Felts — Asphalt Saturated Rag Felt, No. 10, No. 15, and No. 30
Asphalt Saturated Sheathing
Kraft Sheathing
Rosin Sized Sheathing Paper
Deadening Felt—¾-lb., 1-lb., 1½-lb. and 2-lb. per sq. yd.
Blue Plaster Board

Roofing—
Asphalt Roll Roofing Smooth Surfaced; light, medium and heavy weights, with trade names: Modern Edge, Diamond Point, Split Sheet, Pilot and Planet
Slatekote Roll Roofing
Asbestos roll roofing

Composition Shingles—
Slatekote Shingles

Asbestos Paper and Millboard—Flat
Asbestos and Paper in various widths and weights
Corrugated Asbestos Paper
Flat Sheets in various grades and thicknesses

Pipe Coverings—
Asbestocel Pipe Covering
Asbesto-Sponge Felted Pipe Covering
Wool Felt Pipe Covering

Asbestos Siding Shingles
Transite Flue Pipe
Industrial Flooring

85% Magnesia
Asbestocel
Anti-Sweat
Asbesto-Sponge Felted
Banroc
Wool Felt
Superex, Superex Composition
Zero
Fire Felt

LONGVIEW FIBRE COMPANY
Longview, Wash.

Products

Board—
- Sulphate Test Liner
- Sulphate Corrugating Board
- Kraft Boxboard

Paper—
- Plain and Watermarked nachine-glazed Kraft Wrapping
- Plain and Watermarked machine-glazed Kraft Bag Papers
- Watermarked machine-glazed Soap Wrappers
- Machine-glazed Envelope Kraft Papers
- Machine-glazed and fourdrinier Tire Wrap
- Fourdrinier machine finished Wrapping Papers
- Fourdrinier machine finished Butchers' Papers
- Fourdrinier machine finished Bag Papers
- Fourdrinier machine finished Cartridge, Powder and Shell Papers

BAGS—(Plain or Watermarked, machine-glazed or machine finished, printed or unprinted)—
- Grocery Bags
- Millinery and Notion Bags
- Garment Bags
- Barrel Bags
- Poultry Bags
- Nail Bags
- Laundry Bags
- Shopping Bags
- Bread Bags
- Sugar Bags
- Raisin Bags
- Bag Specialties

Containers—
- Solid Fibre Shipping Containers
- Corrugated Shipping Containers

Folding Boxes—
- Clothing Boxes
- Laundry Boxes
- Cake Boxes
- Millinery Boxes
- Folding Box Specialties

Waxed Paper Products—
- Waxed Papers
- Waxed Butter Cube Bags
- Waxed Specialties

Asphalted Paper Products—
- Duplex Waterproof Kraft Sheathing Paper
- Duplex Waterproof Kraft Car Liner
- Duplex Waterproof Kraft Egg Crate Liner Bags
- Duplex Waterproof Kraft Poultry Box Liner Bags
- Asphalted Specialties

Creped Paper Towels & Creped Specialties—

L. A. ENVELOPE MANUFACTURING CO.
Los Angeles

Products

- Business Envelopes
- Catalog Envelopes
- Special Size Envelopes

LOS ANGELES PAPER BAG CO.
Los Angeles

Products

- Grocery Bags
- Notion and Millinery Bags
- Garment Bags

LOS ANGELES PAPER MFG. CO.
Los Angeles, Calif.

Products

- Asphalt Roofing
- Composition Shingles
- Saturated Lining Felt
- Saturating Felt
- Deadening Felt
- Red and Gray Duplex Sheathing
- Car Linings
- Industrial Floorings
- Dry Felts

LOS ANGELES TISSUE CO.
Los Angeles

Products

- Toilet Tissue
- Paper Napkins

NATIONAL CARD, MAT & BOARD COMPANY
Los Angeles, Calif.

- Artists Illustration Board
- Backing Board
- Embossed Boards
- Linen Finish Boards
- Calendar and Photo Mount
- Card and Mat Board Products
- Coated Board
- Cover Papers
- Display Cases and Easels
- Greeting Card Stock
- Illustration Boards and Bristol
- Paper Board Specialties
- Pasted Board
- Picture Backing Board
- Poster Board and Paper

NATIONAL PAPER PRODUCTS COMPANY
Port Townsend, Wash.

Products

- .016 Kraft Liner Board
- .030 Kraft Liner Board
- .016 to .038 Suit Box Board
- Cement Bag Paper
- Grocery Bag Paper
- Kraft Wrapping Paper

OLYMPIC FOREST PRODUCTS CO.
Port Angeles, Wash.

Products

- Bleached Sulphite Pulp

OREGON PULP & PAPER CO.
Salem, Ore.

Products

- White and Colored Bond
- Writings
- Envelope
- Ledger
- Mimeograph
- Glassine, greaseproof—
  - Bleached and unbleached
- Specialties
- Manifold
- Parchment

OWENS-ILLINOIS PACIFIC COAST COMPANY
San Francisco, Calif.

Products

- Corrugated Shipping Cases (1)
- Corrugated Fruit Box Pads
- Liners and Collars (2)

Brands

(1) OnIzed
(2) No-Bruz

PACIFIC COAST PAPER MILLS
Bellingham, Wash.

Products

Toilet Tissue—
- Bleached, Manila and white roll
- Interfolded

Napkins—
- Printed, colored, embossed
- Flat, quarter-fold, eight-fold
- Dispenser fold

Towels—
- Bleached Kraft

Brands

M. D. Tissue, etc.

PACIFIC MILLS, LIMITED
Ocean Falls, B. C.

Converting Plant, Vancouver, B. C.

- Newsprint
- Kraft paper, M. F. and M. G. plain and striped
- Butchers Manila
- Sulphite tissues
  - Toilet tissue
  - Napkins
  - Fruit Wraps
- Towels
- Bread Wraps
- Printed Wrapping
- Plain and printed waxed papers
- Kraft and Sulphite specialties

PACIFIC NORTHWEST PAPER MILLS, Inc.
Portland, Ore.

Bags—
- Garment, Hat, etc.

- Safety Paper
- Decorated Wrappings
- Specialties

PACIFIC SAFETY PAPER MILLS
Los Angeles

Products

- Bank Check Papers

PACIFIC STRAW PAPER & BOARD COMPANY
Longview, Wash.

Products

- Combination Board
- Plain Chip Board
- Solid News
- News and Manila Lined
- Bleached Manilas
- Mist Gray and Colored Boards
- Container Board
- Test Board
- White Patent Coated Board
- Solid Pulp Board
- Egg Case Filler
- Tag Boards
- Folding Boxes

PACIFIC WAXED PAPER CO.
Seattle, Wash.

Products

- Bread Wrappers, plain and printed
- Household Cutter Rolls
- Waxed Carton Wrappers
- Lettuce and Vegetable Crate Liners
- Transparent Cake and Cookie Wrappers
- Butcher and Packers Waxed Paper
- General Line for Cracker and Biscuit Companies

PALMER ENVELOPE CO.
Los Angeles

Products

- Greeting Card Envelopes
- Wedding Announcement Envelopes
- Baronial Type Envelopes
- Commercial Envelopes

PAPER MANUFACTURING CO.
Portland, Ore.

Products

Toilet Seat Covers
Shamrock Brand Wax Lined Food Trays
Roll Roofing

PAPER SPECIALTY CO.
Portland, Ore.

Products

Shamrock Brand Wax Lined Food Trays
Can Liners
Cake Plates
Butcher Plates
Liner Specialties
Paper Raincoats
Toilet Seat Covers
Paper Window Shades
Cake Pads

PAPER SUPPLY CO.
Los Angeles

Products

Resale Rolls of—
Shelf Paper
Tissue Paper
Holly Paper
Decorative Wrappings
Cellophane

PARAFFINE COMPANIES, INC.
Emeryville, Calif.

Products

Rool Roofing
Building papers
Sheathing papers
Car linings
Mulch papers
Pipe wrappings

Brands

Pabco brand on all

PIONEER-FLINTKOTE COMPANY
(Pioneer Paper Co.)
Los Angeles, Calif.

Products

Roofing Division

Rag Roofing—Dry Felt, all weights, 12 to 108 lbs.
Asphalt Yosemite Rock Surfaced Shingles
Asphalt Emulsion
Rosin-sized Sheathing
Blue Plasterboard
K-B Asphalt Sheathing
Insulating Papers
Asphalt Products, Paints, etc.
Mulch Papers
Pipe Wrap Coverings
Car Lining Papers
Duplex Kraft Sheathing
Asphalt Saturated Felt

Box Board Division

Pioneer Super White Patent Coated Box Board
Pioneer Super Manila
Pioneer Super Mist Grey and all colors
Pioneer Super Suit Box Boards
Pioneer Super Poster Card Board
Pioneer Black Ebonkote Board
Pioneer Show Print Board
Pioneer Solid News Board
Pioneer Kraft Board Liners
Pioneer Jute Board Liners
Pioneer Pasted Chip
Pioneer Colored Manila Lined Boards
Pioneer Bleached Manila Lined Boards
Pioneer Book Lined Chipboard
Pioneer News Lined Chipboard
Pioneer Shirt Boards
Pioneer Division Boards
Pioneer Fruit Box Liners
Pioneer Fruit Box Shims
Pioneer Kraft Metal Lath Backing
Pioneer Plaster Board Liner (kraft)

POWELL RIVER CO., LTD.
Powell River, B. C.

Products

News Print

PUGET SOUND PULP & TIMBER COMPANY
Anacortes and Bellingham, Wash.

Products

Unbleached Sulphite Pulp, shredded

RAINIER PULP & PAPER CO.
Shelton, Wash.

Products

Bleached Sulphite Pulp

ST. HELENS PULP & PAPER CO.
St. Helens, Ore.

Products

Bleached and Unbleached Kraft Paper:
Wrapping—both M. F. & M. G.
Envelope
Gumming
Waxing
Bag
Butchers
Tire Wraps—Printed or Plain
Fruit and Canteloupe Wraps
Box Liners
Toweling
Tissue
Waxed Paper

ST. REGIS KRAFT CO.
Tacoma, Wash.

Products

Sulphate Pulp — Bleached and Unbleached

SALINAS VALLEY WAXED PAPER COMPANY
Spreckels, California

Waxed Lettuce Crate Liners
Waxed Specialties

SANI-GARD COVER CO.
Los Angeles

Products

Plants at Portland, Ore., and Los Angeles

Products

Toilet Seat Covers

SCHMIDT LITHOGRAPH CO.
San Francisco, Calif.

Products

Corrugated Shipping Cases
Fruit Box Pads and Liners
Corrugated Advertising Cutouts
Coated Papers for Labels

SHAFFER PULP COMPANY
Tacoma, Wash.

Unbleached Sulphite Pulp

SHERMAN PAPER PRODUCTS CORP.
Los Angeles

Products

Baking Cups
Fluted Cake Pan Liners
Die Cup Liners
Labels
Printed Gummed Cake Bands
Cake Rounds
Corrugated Glassine Products
Embossed and Printed Glassine Doilies
White Waxed Corrugated Circles

SIDNEY ROOFING & PAPER CO., LTD.
Victoria, B. C.

Products

Box Board
Test Board
Felts
Building Paper
Roofing

SOUNDVIEW PULP CO.
Everett, Wash.

Products

Bleached Sulphite Pulp

SPAULDING PULP & PAPER CO.
Newberg, Ore.

Products

Unbleached Sulphite Pulp

STEWART PAPER PRODUCTS CO.
Hoquiam, Washington

Adding Machine Rolls
Cash Register Rolls
Memo pads

THE TISSUE CO.
Camas, Wash.

Products

Bulk Napkins
Tissue Specialties

UNION BAG & PAPER CORP.
Vancouver, Wash.
Converting Plant

Products

Grocery Bags, Sulphite and Kraft.
Glassine Bags.
Candy Bags.
Notion and Millinery.
Waxed Bags.
Coffee Bags, Plain and Fancy Printed.
Nail Bags.
Transparent Cellulose Bags (cellophane and sylphrap).
Egg Crate Liners.
Coffee Bag Shipping Containers.
Special Bags of Varied Nature.
Printed Bags—one to 5 colors.

UNIVERSAL PAPER GOODS CO.
Los Angeles

Products

Special Envelopes
Filing Containers
Crest Moisture Butcher—Dry Finish

U. S. TISSUE CONVERTING CO.
Los Angeles

Products

Tissue Garment Bags
Clothing Boxes

VOLNEY FELT MILLS
Compton, Calif.

Products

Dry Roofing Felt

WASHINGTON PULP & PAPER CORPORATION
Port Angeles, Wash.

Products

Newsprint

WEST COAST PAPER PRODUCTS CO.
Portland, Ore.

Products

Bottle Caps

WESTERN MANUFACTURING & SUPPLY CO.
Los Angeles

Products

Printed Gummed Sealing Tape
Special Gummed Tape in rolls
Gummed Labels, Printed, in sheets and rolls

WESTERN PAPER CONVERTING COMPANY
Salem, Ore.

Products

Adding Machine Rolls
Glassine and Confectionery Bags
Candy Bags
Cellophane Bags and Specialties
Cash Register Rolls
Aluminum Foil, printed
Greaseproof Specialties
School Papers
Wrapping Specialties
Note Books

WESTERN WAXED PAPER CO.
Oakland, Calif., and Portland, Ore.

Products

Waxed Papers—Printed and Plain
Waxed Paper Bags—Printed and Plain
Kleerwrap
Riegelite
Western Opaque
Snowflake Lunch Rolls
Butter Wraps
Bread Wraps
Candy Wraps
Transo
Shredded Waxed Paper
Icepak
Defiance Sheathing Paper
Adsealit Bands
Majonnier Liners
Egg Crate Lining Bags
Gummed Tape
Lettuce Crate Kraft
Bread Wrapping Machines
Plant Covers
Waxfibre
Asparagus Wraps

WESTERN WAXED PAPER CO.
Los Angeles

Products

Bread Wrappers
Waxed Bags
All kinds of plain waxed papers

WESTMINSTER PAPER CO., LTD.
New Westminster, B. C.

Products

Wrapping—
Kraft and Sulphite, 15 to 40 lbs.

Second Sheets—
White and Colored

Vegetable Fruit Wraps—
Plain, oiled, printed

Tissues, all colors

Toilet Tissues—
Plain, creped, glazed

Towels and Napkins

Waxed Paper, plain and printed

Specialties

WEYERHAEUSER TIMBER CO.
Longview, Wash.
Everett, Wash.

Products

Bleached Sulphite Pulp
Unbleached Sulphite Pulp

PULP and PAPER IN JAPAN

By GORDON W. LAND*

The output of paper by the member firms of the Paper Producers' Association which controls more than 90 per cent of the local production, and that of rayon as investigated by the Rayon Producers' Association are given below:

	Foreign Style paper 1000 tons	Rayon tons
1929	633	12,053
1930	611	16,339
1931	594	21,651
1932	585	31,956
1933	643	44,387
1934	710	68,277
1935	768	93,750

The output of foreign style paper reached 768,000 tons in 1935, an increase of 58,000 tons, or 8.2 percent, over that for 1934. For this production, pulp was consumed to the extent of 744,000 tons, of which 690,000 tons was supplied by local pulp firms while the rest came from abroad. It is apparent, therefore, that the domestic pulp is already caring for 83 per cent of the local consumption. The pulp consumed by the firms outside the association is not of sufficient quantity as may materially affect the general condition, since their combined output is less than 10 per cent of the annual paper production. The following table, compiled by the "Diamond" shows the position of demand and supply of paper pulp in recent years (1000 tons):

	Demand	Local Output	Imports
1929	620	619	60
1930	615	627	58
1931	581	567	84
1932	585	551	70
1933	653	620	112
1934	698	675	103
1935	744	690	144

According to the Forestry Bureau of the Ministry of Agriculture, the output of pulp in 1934 reached 692,000 tons of which, excepting rayon pulp, totalled some 17,000, produced in the following forms:

	Tons	Per Cent
Sulphite Pulp	347,000	50.2
Ground Pulp	302,000	43.6
Kraft Pulp	40,000	5.8
Magnuesia Pulp	3,000	0.4

The manufacture of rayon pulp has long been considered a promising industry in this country, because of comfortable prices in the past, they usually being twice as dear as paper pulp, and the anticipated large consumption in the future.

The Oji Paper Mill was the first to enter the industry with a factory in Saghalien built for an annual capacity of 40,000 tons, which was put into operation some time during 1932. On the other hand, the Nippon Rayon Pulp Engineering Co., a subsidiary of Oji, has built another factory in Saghalien with a capacity of 30,000 a year, which is scheduled to be fully ready for capacity production towards the end of June. Nevertheless, their output, even though working at capacity, is apparently insufficient to meet the local demand, which was more than 115,000 tons last year and will increase in the future.

According to the Forestry Bureau of the Ministry of Agriculture, Japan's esources of woods available for pulp manufacture is some 7,916,000 koku (a koku corresponds to 10 cu. ft.) of which 6,122,600 koku or 77.3 per cent will be felled in Saghalien, 1,476,000 or 24.1 per cent in Hokkai, 314,000 or 4 per cent in Korea and 3,000 in Japan proper. In 1934, Oji and its subsidiary consumed 95.8 per cent of the wood which was utilized for pulp manufacture. The supply is destined to be completely exhausted in the near future if an increasing number of trees should be felled. For this reason, Oji and other firms have had their eyes on the vast forest resources of Manchoukuo.

Since the independence of Manchoukuo, more than 20 firms have proposed to develop its forests for pulp manufacture, whether for rayon or paper, but most of these were mushroom projects and met an abortive ending during the past three years. These which survived are five. Even amongst these five, there are one or two which have already come to an impasse due to financial difficulties or the Manchoukuo government's reluctance to grant forest concessions. The government recently announced authorization to some firms to fell trees to an extent not exceeding 15,000 tons for the first year and 20,000 tons for the second and thereafter.

The quantity thus stipulated will hardly place the industry on a paying basis since 30,000 tons has been regarded as the minimum annual quantity to operate the industry on a paying basis in Saghalien, but this quantity does not guarantee a sound business in Manchoukuo, where bandits are still at large and new transport facilities must be laid down at great cost. This is the reason why the existing pulp firms established in Manchoukuo must merge so that they may fell at least 30,000 tons a year. In the light of this fact, many experts think that only one firm, or possibly two, will be capable of starting pulp manufacture in Manchoukuo.

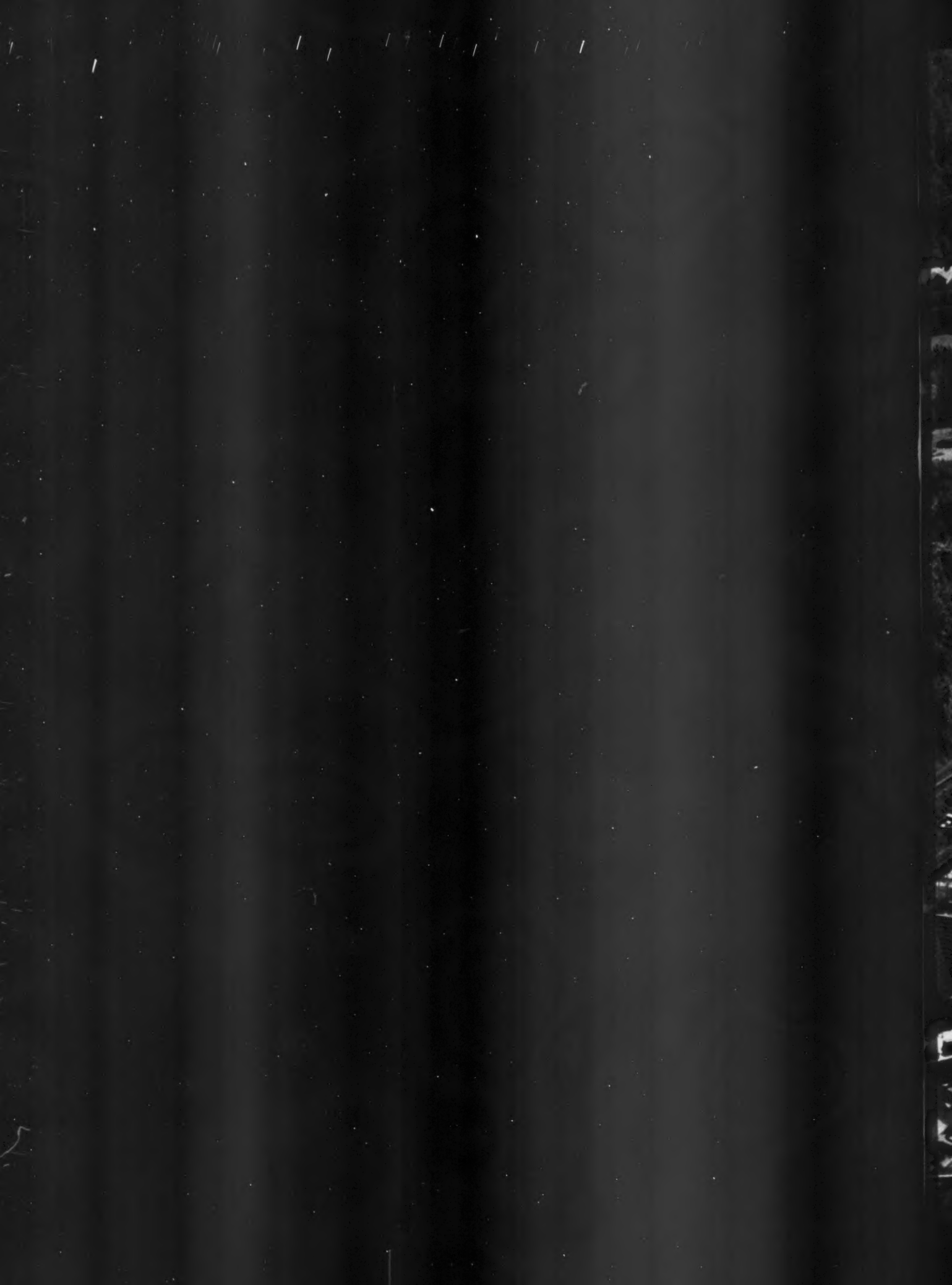
Production and sales statistics for March proved satisfactory as shown by the following figures:

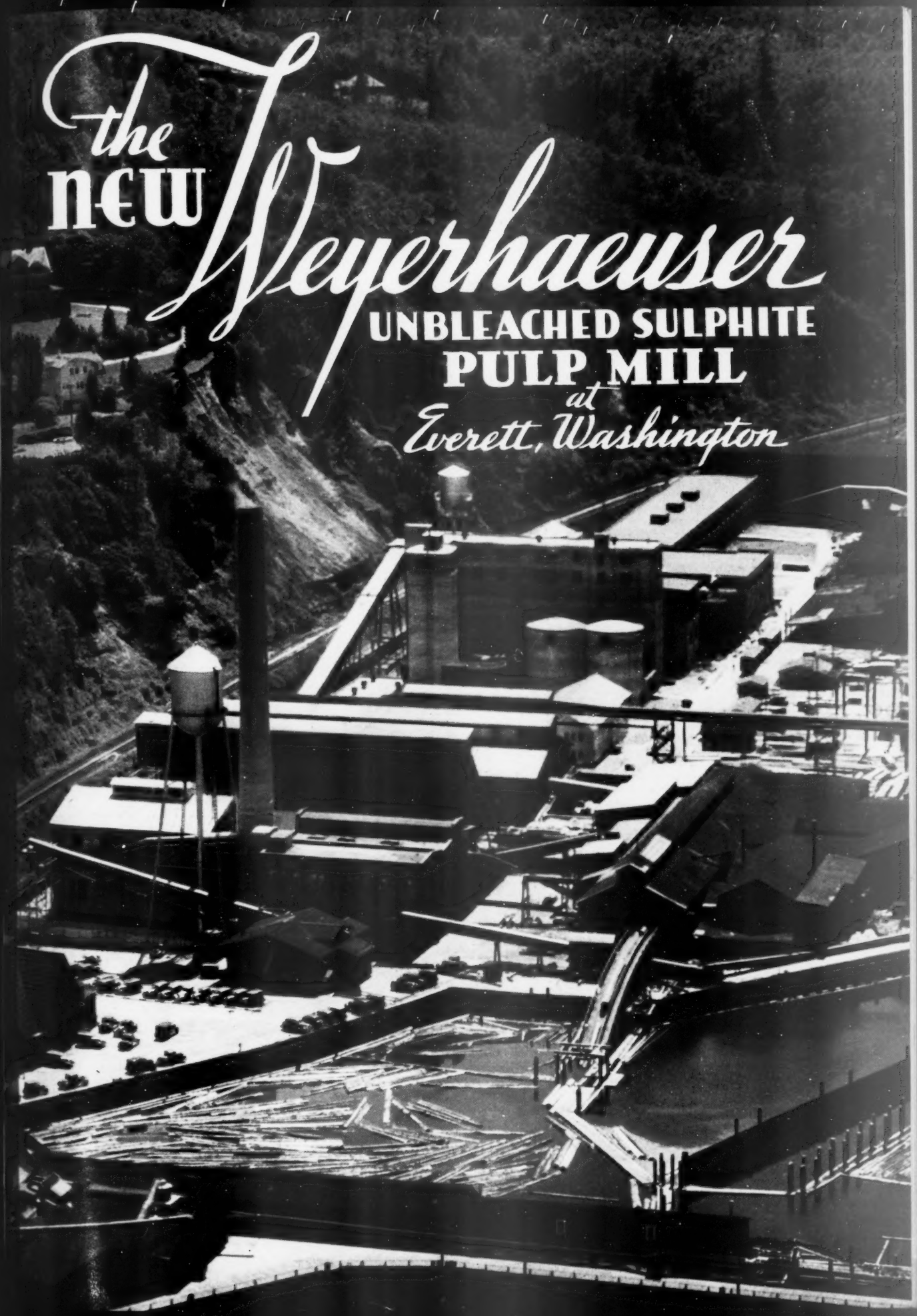
	Production Lbs.	Sales Lbs.
Oji Paper Mill	120,558,423	124,617,630
Mitsubishi Seishi	6,733,773	7,476,500
Hokuetsu Seishi	5,428,335	5,910,488
Nippon Shigyo	3,781,470	3,838,512
Inui Seishi	2,795,136	2,510,146
Nippon Seishi	2,774,099	3,055,711
Nishino Seishi	625,344	598,636
Showa Seishi	758,572	753,553
Asahi Seishi	575,737	575,737
Tomoegawa Seishi	756,181	727,089
Taisho Kogyo	843,245	833,785
Gakyo Seishi	687,074	635,673
	146,317,389	151,533,460

Classified into grades the figures were as follows:

	Production (Lbs.)	Sales (Lbs.)
Printing Paper (sup.)	12,159,874	13,243,947
Printing Paper (ord.)	16,150,543	17,574,672
Drawing Paper	7,184,626	7,299,811
Simili Paper	6,968,246	9,505,366
Art Paper	2,975,357	2,221,932
Newsprinting Paper	61,934,506	61,544,021
Sulphite Paper	3,065,891	3,636,151
Colored Paper	886,355	895,513
Wrapping Paper	19,757,035	20,986,847
Japanese Paper	2,494,324	2,194,900
Board Paper	7,116,318	7,012,880
Sundries	5,604,314	5,407,420
	146,317,151	151,533,460

*A. Cameron & Company, Kobe, Japan.




the new Weyerhaeuser
UNBLEACHED SULPHITE
PULP MILL
at
Everett, Washington

WEYERHAEUSER BUILDS A QUALITY UNBLEACHED SULPHITE MILL

The New 150 Tons Per Day Pulp Mill at Everett, Washington, Began Production in June

IN June, 1936, the Weyerhaeuser Timber Company, through it's Pulp Division, completed and placed in operation a quality unbleached sulphite pulp mill of 150 tons daily capacity, located on the shore of Puget Sound in the city of Everett, Washington, U. S. A.

Pulp was produced a year and four months after the announcement was made on February 14, 1935, of the company's intention to construct a second pulp mill.

The first pulp mill built by the Weyerhaeuser Timber Company was completed in November, 1931, at Longview, Washington, on the Columbia River. The Longview pulp mill, with a daily production of 175 tons of high quality bleached sulphite pulp, has contributed materially to the present enviable reputation of Pacific Coast pulp in the markets of the world.

The Everett mill, second unit of the Weyerhaeuser Pulp Division, has been designed with the primary aim of supplying a fine quality domestic unbleached sulphite pulp comparable in quality to the bleached sulphite produced at the Longview mill. As unbleached sulphite pulp sold on the market is very largely imported (693,026 tons in 1935) the Weyerhaeuser unbleached mill with an approximate yearly production of 45,000 tons, will replace a small portion of the imported pulp with American production made from American wood by American workmen, and employing equipment and supplies made in the United States.

J. P. WEYERHAEUSER, JR.,
Executive Vice-President
Weyerhaeuser Timber Co.

The Place of Pulp in the Weyerhaeuser Program

With the Weyerhaeuser Timber Company the manufacture of wood pulp is complementary to the production of lumber. Wood pulp increases the possible utilization of Pacific Coast forests by creating a broader and more diversified market for timber.

By the construction of their second pulp mill the Weyerhaeusers have increased the economic utilization of their own forests, and have contributed to the more profitable use of all Pacific Coast forests.

The wood which is being used (more than 90,000 cords per year) in making this quality unbleached sulphite pulp in the new Everett mill, would not, for the most part, find any other outlet either for the Weyerhaeuser Timber Company or for the community.

Logging of mature pulp timber along with mature sawmill timber, and the conversion of the pulpwood into pulp, represents true economic forest practice and contributes the maximum wealth to the country.

That is the Weyerhaeuser idea, to harvest timber with the greatest efficiency, creating the maximum utility from each forest crop. This practice contributes further to the public welfare, for thoroughly efficient logging contributes the best conditions for the continuous growing of timber crops.

The building of a second pulp mill by the Weyerhaeuser Timber Company represents a very substantial contribution to both permanent employment and permanent community wealth.

Weyerhaeusers Came to Pacific Coast in 1900

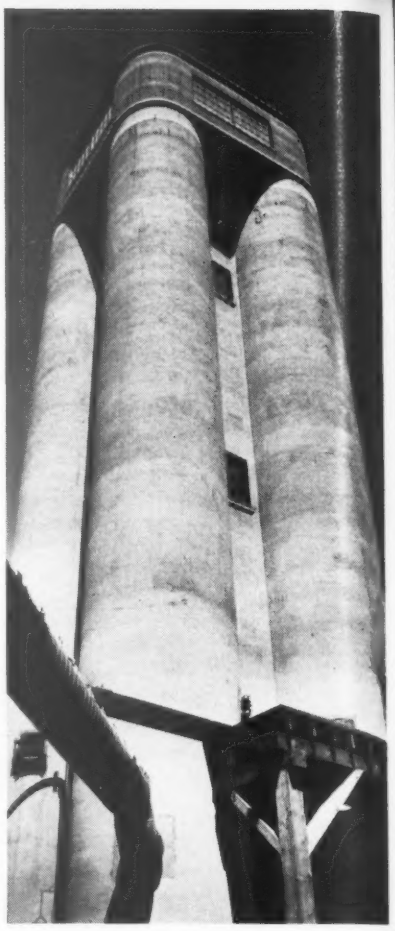
From the time the Weyerhaeusers entered the Pacific Northwest lumber industry in 1900 until their first pulp mill at Longview was started in 1931, their organizations concentrated on the mechanical utilization of wood. Logging was for the sawmill alone. Those species not economic for the production of lumber were either left in the woods or brought out to be disposed of for whatever they would bring.

Up until the pulp industry on the Pacific Coast entered its era of development in 1926 there was practically no market for pulpwood, and pulpwood had no value as such.

Everett Pulp Mill a Logical Step

In their plan of maximum timber utilization the construction of a pulp mill at Everett, Washington, by the Weyerhaeuser Timber Company, was a logical step.

At Longview the bleached sulphite pulp mill serves as a partial outlet for the pulp timber from the Weyerhaeuser logging operations tributary to the great



Weyerhaeuser sawmills located there, the largest of Weyerhaeuser lumber producing units.

With two sawmills, Mills B and C, operating in Everett, the Snoqualmie Falls Lumber Company operating in the Cascade mountains east of Everett, and with the White River Lumber Company running a large sawmill at Enumclaw in the edge of the Cascades east of Tacoma, the Weyerhaeuser logging operations supplying these plants with logs were faced with the problem of cutting timber stands

F. R. TITCOMB
General Manager
Weyerhaeuser Timber Co.

with an increasing percentage of trees more suitable for wood pulp than for lumber.

As these logging operations are all tributary to Puget Sound the logical step was the construction of a pulp mill on that body of water to utilize a part of the potential pulpwood logs. A pulp mill would permit better balanced, more economic logging.

This situation coupled with the belief that the United States should be, to a greater degree, self-supporting in the production of wood pulp for the market, caused the Weyerhaeuser organization to build the Everett mill for the production of exceptionally high quality unbleached sulphite pulp.

Located on the Site of the First Sawmill

The new Everett pulp mill is located on the site of the first Weyerhaeuser sawmill in Everett, known as Mill A. It was purchased in 1902 and the sawmill was rebuilt and enlarged several times in the intervening years. As it was located on deep salt water the Mill A site became the natural shipping point for water shipments of lumber from Mills B and C, which are located on the Snohomish River several miles away. The large docks will accommodate several ocean freighters at one time. In the aerial photographs lumber from Mills B and C is shown being loaded into ocean freighters. The docks are open to public use and a large part of Everett's waterborne commerce passes over them.

The Weyerhaeuser Organization

The Weyerhaeuser Timber Company head offices are in Tacoma, Washington. Mr. F. S. Bell, chairman of the board, lives in Rock Island, Illinois, where Mr. Frederick Weyerhaeuser (1834-1914), the founder of the Weyerhaeuser companies, first started in the lumber business.

Mr. F. E. Weyerhaeuser, president of the company, lives in St. Paul, Minnesota. The ranking officer who lives on the Pacific Coast is Mr. John Philip Weyerhaeuser, Jr., executive vice-president, whose home is in Tacoma. Mr. A. W. Clapp is vice-president and general counsel. Mr. Laird Bell is vice-president.

The treasurer is Mr. H. H. Irvine, and the company secretary is Mr. W. L. McCormick.

Mr. F. R. Titcomb is general manager, and Mr. Charles H. Ingram is assistant general manager. Mr. Minot Davis is manager of the timber and logging department.

Head of the Pulp Division of the Weyerhaeuser Timber Company as manager is Mr. Robert B. Wolf. The Pulp Division was organized in 1930 prior to the construction of the bleached sulphite pulp mill at Longview. Manager of the Longview pulp mill is Mr. W. Norman Kelly.

In charge of the new Everett unbleached sulphite pulp mill as manager is Mr. G. S. Brazeau, who joined the Pulp Division when it was organized in 1930. Until July, 1935, when he came west to Everett, Mr. Brazeau devoted his time to the sale of pulp produced at Longview.

Organization of the Everett pulp mill under Mr. Brazeau is divided into five departments. Actual operation of the pulp mill is divided between two operating superintendents, Mr. James D. Fraser and Mr. Walter J. Clough. Mr. Fraser has supervision of all production processes from the breakdown of the log until the pulp is blown from the digesters.

Taking charge of the pulp in the blow pits, Mr. Clough supervises its processing through to the finished bales.

As plant engineer, Mr. L. E. Hill, Jr., is in charge of all maintenance and engineering work developing from mill operations.

In charge of the control laboratory and as coordinator of the technical control system by which the Everett pulp mill is operated, is Mr. Gerald F. Alcorn, technical director.

Looking after the cost accounting system essential to efficient operation of the Everett mill, is Mr. Orville E. Fox, who, as chief accountant, has charge of all cost work and sales billing.

For the most part the key operating men in the Everett pulp mill were trained in the Weyerhaeuser Longview pulp mill, in line with the policy of Mr. Robert B. Wolf, manager of the Pulp Division, to develop leadership from within the personnel of the organization.

Robert B. Wolf

The Pulp Division of the Weyerhaeuser Timber Company was organized and has been developed to its present high standing in the industry under the direction of Mr. Robert B. Wolf.

Prior to joining the Weyerhaeuser organization in 1930, Mr. Wolf had devoted some twenty-five years to the manufacture of high grade sulphite pulps in the eastern part of the United States and Canada, and for several years he had studied the production of sulphite pulps on the Pacific Coast from the standpoint of bleaching. His experience and knowledge rate him internationally as an authority on both the manufacturing and sales problems of the industry.

Under Mr. Wolf's management a high degree of esprit de corps has developed among the men of the Pulp Division which has resulted in an enviable efficiency in mill operations.

O. C. Schoenwerk

As a consulting engineer Mr. Otto C. Schoenwerk has met with success in solving problems of many industries, from street railways to automobile wheels, and from textile plants to pulp and paper mills.

Since 1928 Mr. Schoenwerk has devoted almost his entire time to the pulp and paper industry. Besides participating in the construction of several mills, he has personally designed and supervised the construction of three modern Pacific Coast pulp mills, including the Weyerhaeuser bleached sulphite pulp mill at Longview, Washington, and the new unbleached sulphite pulp mill at Everett, Washington.

His engineering genius has become evident in the pulp industry through the simplicity of his design, the economy of his sound construction, the injection of more efficient practices from other industries, the ease of operation and the low maintenance cost of the pulp mills he has designed and built.

When the Weyerhaeuser Timber Company first began the studies which later resulted in the decision to construct a second pulp mill, the officers, being entirely satisfied with the Longview mill, engaged Mr. Schoenwerk to design and supervise the construction of the Everett pulp mill. This "repeat order" testifies to the confidence felt by the Weyerhaeuser organization in Mr. Schoenwerk's ability to build a thoroughly modern and profitable unbleached sulphite pulp mill.

O. C. SCHOENWERK
Consulting Engineer
Designed and Supervised Construction of the Weyerhaeuser Pulp Mills at Everett and Longview

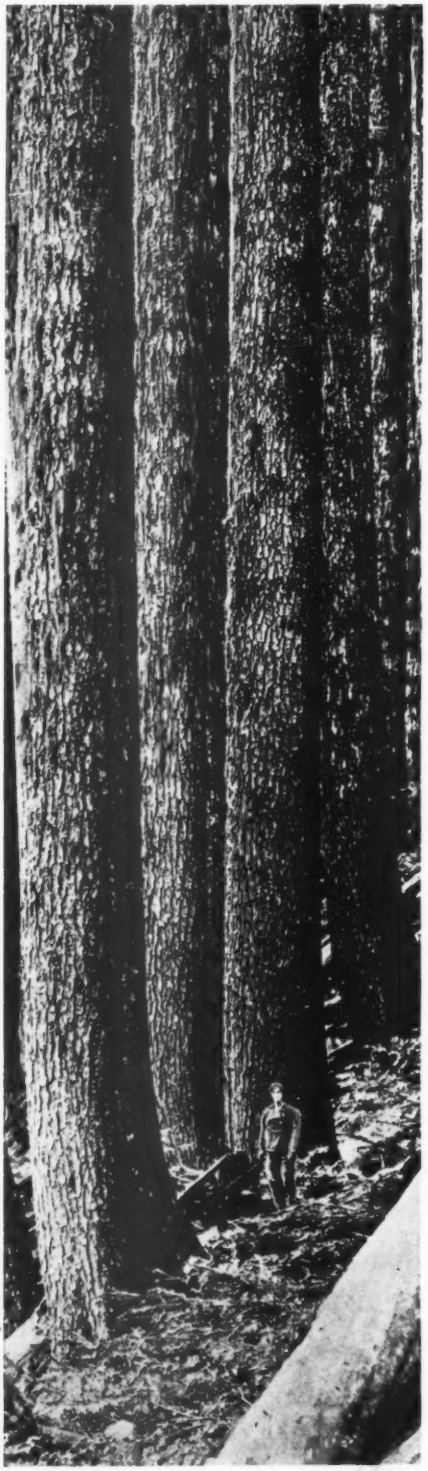
R. B. WOLF
Manager Pulp Division
Weyerhaeuser Timber Co.

G. S. BRAZEAU
Manager Everett Mill
Pulp Division
Weyerhaeuser Timber Co.

PULP CONTRIBUTES To ECONOMIC FOREST PRACTICES

By MINOT DAVIS

Manager, Timber and Logging Department, Weyerhaeuser Timber Co., Tacoma, Washington



Western Hemlock

THE construction of our Longview pulp mill in 1931 and the addition of the Everett pulp mill, described in this issue of Pacific Pulp & Paper Industry, indicate a trend in the history of the Weyerhaeuser Timber Company probably typical of the forest industries of the Northwest.

The diversification of products which these ventures exemplify will make possible profitable use of trees to a degree otherwise impossible.

As substitute materials have found places in the building and industrial uses of this country, the per capita consumption of lumber has decreased. Transportation has constantly added to the consumer's cost as the forest industries have of necessity followed the trees westward. Probably substitute materials will continue to place a ceiling on lumber values and uses, which means that many of our trees cannot be used profitably for manufacturing lumber. While this contraction of the lumber market is in a measure being met with greater refinement and cost reduction through the use of better methods, it is logical and pleasing to provide facilities to convert trees to uses for a market which is not only expanding, but is today supplied very largely by foreign producers.

Pulp Provides Greater Utilization

More trees will be used as an acre is logged. More local labor will find a market for its services in the refinement processes. Also, as cut-over lands are left and maintained for regrowth, the second crop can be harvested earlier.

Utopia for a forester, for the public, or for a lumberman lies in the ability of the industry to maintain itself by growing raw material as fast as it is cut. There is no doubt that these pulp mills are operating and will continue to do so on a sustained yield basis.

Western hemlock and Amabilis fir are the principal species of trees used as a base in the manufacture of sulphite pulp. On many high mountain ranges and in certain other restricted areas, they are the predominating species. But as produced today, these two species occur mixed in with a predominating stand of Douglas fir, in which the pulp species themselves seldom constitute more than 25 per cent of the forest.

Balancing Log Production

In conducting logging operations to supply a large sawmill and pulp manufacturing operation, as at Longview and at Everett, one of the ever present problems is that of balancing the production of logs. That is, to produce as nearly as possible, the proper proportion of large fir logs for the large fir mill, small fir logs for the small fir mill, and pulp logs for the pulp mill. At Longview the problem is further complicated by the necessity of producing also the right proportion of cedar for the cedar lumber and shingle department.

Since the percentages of the different species in the forest are subject to continual variation as the logger covers the ground, the most careful planning of operations is required ever to approximate the proper production of each species to keep each department of the manufacturing division running steadily.

To segregate the different species in the woods would mean the loss of valuable time, which must be devoted to production. Therefore, the logger must take each log as he comes to it, regardless of species, and let all separation of grades and species be done in the water at the log boom, where it can be done to the best advantage.

Providing for Perpetual Operations

A modern West Coast logging operation is not the ruthless slaughter of trees that is sometimes assumed by persons unfamiliar with the facts. While it is necessary in most operations at present to cut clean, yet the logger plans his operations so as to make re-seeding possible. Above all, he burns his cut-over aceas in as small tracts as possible, so as to diminish the chances of a large forest fire. After the first necessary burning, much time, thought and money is spent in the prevention of any further fires. Protection from fire is the great keynote of forest reproduction on the Pacific Coast.

With the abundant moisture, conditions in Western Washington and Oregon are extremely favorable for the perpetual reproduction of the desirable forest trees. In countless localities at the present time may be seen splendid areas of reproduction. Methods of logging will change, but the production of pulp and other forest products in the Pacific Northwest seems capable of lasting for an indefinite length of time.

MINOT DAVIS

PRODUCTION FOLLOWS A STRAIGHT LINE——

A Flow Description of the New Weyerhaeuser Pulp Mill

MEN of analytical minds are constantly striving to reduce chemical and mechanical processes in industry below what is generally accepted at the time as the "irreducible minimum." They seek to simplify in order that the finished products may more closely approach perfection and that costs may be lowered.

As a result the "irreducible minimum" in processes, in equipment of yesterday is reduced today and probably will be lowered still further tomorrow.

The manufacture of wood pulp by the sulphite process has been undergoing this intensive analysis in recent years. Although the basic principle remains unaltered, the refinements and the improvements in processes and in equipment would make the latest sulphite pulp mill seem a remarkable instrument to the first sulphite men, Tilghman in 1866 and Ekman in 1874.

The sulphite pulp mill of today is a finely designed and a finely built instrument compared with what was called a "modern" mill of but a few years ago. Today's sulphite pulp mill, when looked upon as an instrument for producing a high quality and uniform product, can be handled by the operators, through the conscious coordination of principles of management, with all the skill of a master musician knowingly bringing forth the finest tones of which his instrument is capable.

The process of taking a tree, a highly complex natural product, embodying all the structural variations to which a product of Nature is subject, separating from it the desired cellulose, and bringing forth an end product that is as uniform as the original tree is variable, is really a remarkable achievement. But to the men in the industry it is merely the day's work to strive toward perfection. What they have already accomplished is to them but the basis for further effort.

On the waterfront at Everett, Washington, stands the latest design in unbleached sulphite pulp mills, the new 150 tons per day mill of the Pulp Division of the Weyerhaeuser Timber Company. It represents an important forward step in the progress of the sulphite industry.

The Idea Behind the Mill

Mr. Robert B. Wolf, manager of the Pulp Division states: "Our decision to build Weyerhaeuser's first unbleached pulp unit was governed by our desire to supply the American paper industry with a dependable source of high quality unbleached pulp."

Mr. O. C. Schoenwerk, the Pulp Division's consulting engineer, who designed and supervised the construction of the successful Weyerhaeuser bleached sulphite pulp mill at Longview, Washington, was

The forest area in Western Washington and Western Oregon from which pulpwood may be drawn for pulp mills at Everett and Longview, Washington, is roughly shown on the above map.

The figures shown in each county represent the total volume of pulpwood species in cubic feet within its borders.

It is evident that the Weyerhaeuser Pulp Division's Bleached Sulphite mill at Longview, Washington, on the Columbia River, and the Unbleached Sulphite mill 180 miles North at Everett, Washington, on Puget Sound, are each located in the center of tremendous reserves of pulpwood.

commissioned to design the finest possible unbleached sulphite pulp mill.

The design evolved by Mr. Schoenwerk was conditioned by the pulp quality desired. In achieving these qualities, he applied ideas new to the pulp industry. New and simpler methods were worked out. Equipment was frequently redesigned to better perform its special function.

Knowledge gained from four years operation of the Longview mill, where complete operating data is daily recorded and interpreted, was drawn upon in working out the final design of the Everett mill.

The necessity for exceptional cleanliness offered a difficult problem. It was essential that the small, black, ingrown knots in Western Hemlock be entirely removed in the wood room. These knots contribute dirt which cannot be fully eliminated later in an unbleached mill.

Once it was certain that none but clean chips would reach the digesters, safeguards had to be employed at every step to maintain the cleanliness of the pulp through to the baling operation. This was a difficult job but it has been solved by the design and equipment of the new mill.

From the digesters on, the pulp never contacts any material capable of contributing dirt. All piping, all pumps and all equipment is non-corrosive. No iron is allowed to contact the pulp at any point in the process. A clean final product is attained through the use of stainless steel, bronze, copper, Monel metal, rubber covered steel, glazed tile, wood pipe and wood tanks with water sealed tops.

Pure water was provided, free from all dirt, minerals, or slime forming bacteria, by the construction of an all Douglas fir water filter plant of 16,000,000 gallons per day capacity.

The acid plant produces uniform acid under complete control. Acid filters, to remove any dirt picked up from the lime rock, are of new design and extra large capacity. A high pressure acid system contributes to uniform acid.

Cooking is uniform. While this is the direct responsibility of the cooks, they must have the equipment in order to produce the desired results. A Chemipulp System assists in turning out uniform pulp.

The cooking is flexible, permitting the production of a variety of types of pulp. Thorough instrumentation of the cooking process provides for controlled flexibility in cooking. Digesters, piping valves and fittings were all specially designed to the end that cooking might be varied as desired, but always with a record of what had been done and of what was being done, visible to the operators.

Every variable in the cooking process has been placed under instruments that record and in some cases control.

Uniformity requires perfect blending of the various cooks. New ideas were employed in designing the blending system. Complete segregation of different types of pulp is possible without interference with operations.

The pulp drying machine and its auxiliary equipment were built to keep the pulp clean and to preserve its strength and color.

Producing in a Straight Line

Efficient industrial plants in the United States invariably carry on their manufacturing processes in a straight line from raw material to finished product. Among the advantages are a reduction in handling costs, greater speed of production through having the semi-manufactured product always at hand for the next step, and a reduction in the amount of equipment required to produce the required quantity of the finished product.

Straight line producing appears simple once it is accomplished. It seems on the surface to have been the only sensible way. But to achieve straight line production with its attendant economies is actually a difficult engineering problem.

Laying out in advance the smooth uninterrupted flow of raw materials through the several steps requires engineering skill of the highest order.

It is not possible to include in a relatively short article all of the many new and unusual ideas built into this new Weyerhaeuser pulp mill by Mr. Wolf, Schoenwerk, and by other members of the Pulp Division, but an attempt is made in the article that follows to outline some of the various features which set this mill apart.

PREPARING THE WOOD

The old adage "as the twig is bent so is the tree inclined," might well be turned in the unbleached sulphite industry to "how the wood is prepared determines the quality of the pulp."

Studies made in the Weyerhaeuser mill in Longview determined what had to be done to insure absolutely clean wood reaching the digesters. The problem then was to design equipment which would thoroughly clean the wood at low cost, and to so arrange this equipment as to provide the maximum efficiency in operation.

The Mill A sawmill was rebuilt for use as a log breakdown plant. It is being utilized to speedily reduce the logs to cants of approximate uniform size. Experiments in the Longview mill had shown that by cutting the cants to a maximum thickness of 4 inches and a maximum width of 16 inches, the small ingrown black pin knots characteristic of Western hemlock would all be revealed to the eye. Were the cants cut square many knots would escape detection and contribute dirt and color to the pulp.

This method of cutting the logs is the first safeguard employed by the Weyerhaeuser Pulp Division to provide clean pulp of high color.

The smaller sized slabs are carefully cleaned in the break down plant on four Sumner hand barkers into which are built knot saws. Slabs first pass through a bolter which cuts them to uniform width. The barker operators then bark the slabs, and when knots or defects are found they simply turn to the right and quickly saw them out. A 51-inch Sumner chipper chips the cleaned slabs.

The Wood Cleaning Plant

The cants from the break down mill, trimmed to a length of 10 feet, are taken by a chain conveyor to the wood cleaning plant where they are distributed to four Stetson-Ross barking machines.

The Machine Barker

The Stetson-Ross "43" Patented Log Section Barking Machine was selected by Mr. Schoenwerk for the Weyerhaeuser Timber Company's Everett pulp mill because it so very completely and adequately met the requirements demanded by him for barking the sections of either large or small logs with a minimum of waste.

The outstanding feature of this new patented machine is that it is provided with a slewing concave cutter head arranged so that it may be adjusted to fit any size log within a specified range while the stock passes through in plain view of the operator for inspection. This is a decidedly important factor in saving wood. (U. S. and Canadian patents have been granted.)

The "43" is a highly productive barker, universal in its adaptability and simple in operation. The controls are especially complete, and are placed within the control of a single operator. Without leaving his position he can, by means of push buttons, hand or foot levers, operate as follows:

1. To start, stop, or reverse the movement of the stock as it passes through the machine.
2. Raise or lower the cutter head to suit the various thicknesses of stock.
3. Slew the concave head to fit the various sizes of stock.
4. Adjust the cutter head to right or left within the ring to the required degree for removing the bark.
5. Raise or lower the steam pressure rolls.

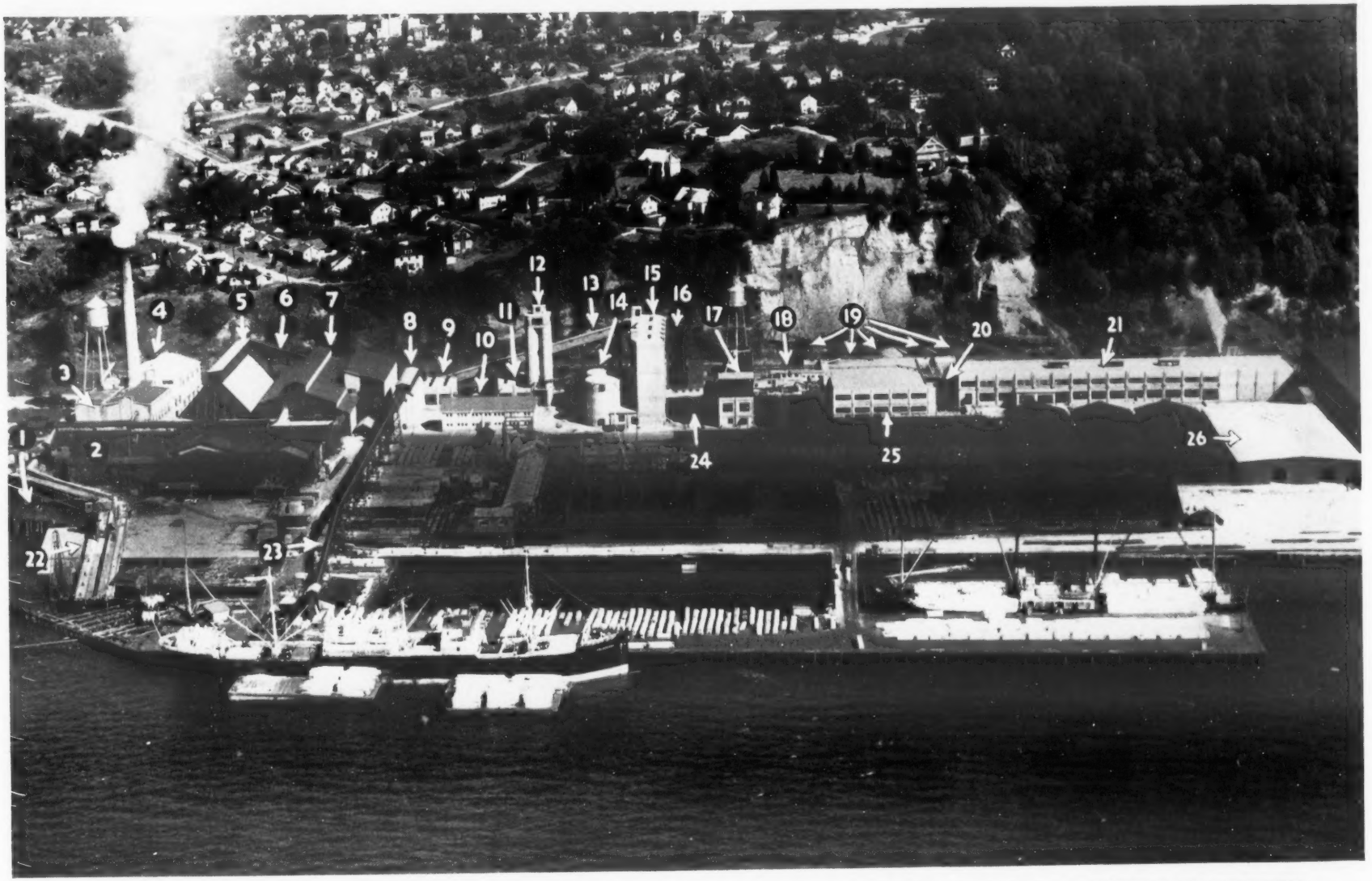
The push buttons are built into the grips of the levers in such a position that the operator, while retaining his hands on the operating levers may, with his thumbs, manipulate the motors controlling direction of the feed and the position of the slewing head.

It will be noted in the photograph that the right angle roll feed works is placed about twenty degrees from the perpendicular and horizontal positions, and that the barker cutter head assembly is mounted on ways inclined upward toward the operator. The primary purpose of this arrangement is to increase the visibility of the unbarked surface of the log section. As the log section is passing through the machine with its curved, unbarked surface facing the operator, it can be readily inspected and the cutterhead adjusted properly and quickly to remove the bark. After the stock has passed the barker head, any of the bark that is left will be quickly discovered by the operator. He may then reverse the feed and take another cut to remove any bark that was missed by the first cut. Because of the great flexibility of the machine, there is no need to take a heavy cut on the first passing through of the stock. Although the majority of all pieces passing through the first time are completely barked, economy in operation suggests taking a light cut at the risk of missing some of the bark, for another cut may be taken quickly.

It is also important to note that as the log sections are brought to the barking machine on conveyor chains, they slip by gravity into the feeding position and are held firmly in this position by the pressure rolls forcing the stock against the right angle feed rolls. This right angle feed works guides the log at a fixed position within the ring and makes possible the accurate positioning of the cutter head, relative to the moving position of the wood.

Manufacturers of pulp will be quick to observe that the Stetson-Ross "43" Barker, together with the plan of barking in comparatively long and large sections (minimum waste in sawing the log), will rapidly replace the old methods of cutting the wood up into short cord wood lengths and small diameters. The Stet-

No. 15, digester building. No. 16, gas condensing towers; No. 17, washer and knotter building; No. 18, stock blending tanks; No. 19, stock blending and storage tanks; No. 20, screening room; No. 22, hogged fuel unloading from barges and conveying to storage or to power plant; No. 23, sulphur conveyor—ship to storage building; No. 24, below pits; No. 25, riffler and flat screen building; No. 26, pulp storage building.



IDENTIFYING THE VARIOUS DEPARTMENTS OF THE NEW WEYERHAEUSER UNBLEACHED SULPHITE PULP MILL AT EVERETT, WASHINGTON

No. 1, log storage pond; No. 2, log breakdown plant; No. 3, hogged fuel storage building; No. 4, power plant; No. 5, chip storage building; No. 6, conveyor from chipping plant to chip storage; No. 7, wood cleaning and chipping plant.

No. 8, sulphur storage building; No. 9, sulphur burner building; No. 10, office and control laboratory building; No. 11, acid plant; No. 12, acid towers and gas absorption towers; No. 13, chip conveyor to digesters. The conveyor structure supports the large steam line running from the boilers to the digester building and machine room; No. 14, acid accumulators; No. 15, digester building.

No. 16, gas condensing towers; No. 17, washer and knotter building; No. 18, stock blending tanks; No. 19, stock blending and storage tanks; No. 20, screened stock storage; No. 21, machine room; No. 22, hogged fuel unloading from barges and conveying to storage or to power plant; No. 23, sulphur conveyor—ship to storage building; No. 24, below pits; No. 25, riffler and flat screen building; No. 26, pulp storage building.

son-Ross system of barking is to bark long log sections instead of slabs; and the "43" is the result of a keen analysis of the fundamental problem of converting logs into pulp with a minimum amount of waste.

The Stetson-Ross barking machines are entirely equipped with SKF bearings.

Knot Borers

Directly from the barking machines the cants pass by a very short series of conveyor rolls to the twenty-four Sumner knot borers. These new machines were specially developed by the Sumner Iron Works of Everett, Washington, in collaboration with Mr. Schoenwerk.

The name knot borers does not adequately describe the versatility of these machines. Each of the twenty-four consists of a table for supporting and moving the cants; a turnover device for completely turning the cants; a dogging device for rigidly holding the cant during the cleaning operations; a movable drill for boring out knots; a device for using the drill as a router to remove rot and pitch seams; and, a knot saw for cutting out edge knots and defects.

The radial arm drill press consists of a column, a spindle, hydraulically raised and lowered, on which is mounted a radial arm, hand operated in in and out turning positions. The drill is directly operated by a special Westinghouse motor of 5 horse-power running at 3600 r.p.m. synchronous speed with a special arbor mounted in SKF bearings. The spindle and radial arm are also mounted on anti-friction bearings. The drill is a special twist drill designed with clearances and relief to permit routing as well as boring.

A fan is connected with the motor and through a telescoping suction box arrangement removes dust and chips while the machine is drilling or routing. The refuse consisting of knots and other defects is drawn through the fan into a flexible metal exhaust conveyor into hoppers from which it is discharged onto a belt refuse conveyor. This waste removal system eliminates the possibility of any particles from the drilled black knots becoming embedded in the clean wood.

The drill is prevented from moving sidewise during the drilling by two sets of hydraulically and automatically operated brakes. During the drill stroke the turning of the arm is automatically locked as well as the in and out position of the radial arm.

Another automatic feature of these machines is the dogging or secure gripping of the cant while drilling. Both the cant and the drill is thus securely locked while the drilling is being done.

The stroke of the drill press is adjustable as is also the speed of the drill. Once set, and without special arrangement, the drill speed going through the cant is fixed, thereby making it impossible for the operator to increase this drill speed so as to do damage or to stall the motor.

The device for turning the cants in the Sumner knot borer consists of a floor mounted set of frames securely tied in and with a set of three vertically moveable frames carrying gravity rolls. These roll frames are operated by air or steam cylinder and controlled by a foot pedal convenient to the operator. Normally the roll frames are always in the up position for receiving cants. A set of turning arms pivoted inside of the frame structure is arranged and controlled from the front of the table to a conveniently located arm permitting resetting of the turning points to suit the varying width of the cants.

In turning the cants it is only necessary to step on the foot operated cylinder valve which instantly allows the roll frames to drop, thus also permitting the cant to drop by pivoting around the turning arms, and in turning the cants are guided in such a way as to make a complete turnover. By removing his foot from the throttle, the operator causes the cants to again be raised to the original operating and high position once more permitting inspection and drilling or routing.

It is clear that with the above arrangement of the cant turning device, it is unnecessary to up edge the cants for turning above the operating roll level. The cant drops down out of the way, saving the time that would otherwise be necessary to elevate the drill so it could be cleared or swung out of the way. This system makes for speed and also for safety for the operator or for the drill.

Inspection

As the clean cants are discharged from the knot borers they are conveyed by live rolls to the center of the wood room and transferred onto the conveyors going directly to the chippers.

An inspector examines each cant for defects that have been overlooked and rejects any that do not come up to the fixed standard. As the cants are stamped with the number of the knot borer upon leaving the machines, the efficiency of the operators of each of the 24 knot borers in removing defects is stimulated by a daily rating in percentage of 100.

Washing

Before being carried to the chippers the cants pass through a washer where water under high pressure from spray nozzles direct streams of water on all four sides of the cants.

The cants, with the narrow edge up, are fed by gravity through long steel chutes into the three 72-inch Sumner chippers where they are cut to chips of uniform size. The chippers have a number of features contributing to steady production of good chips.

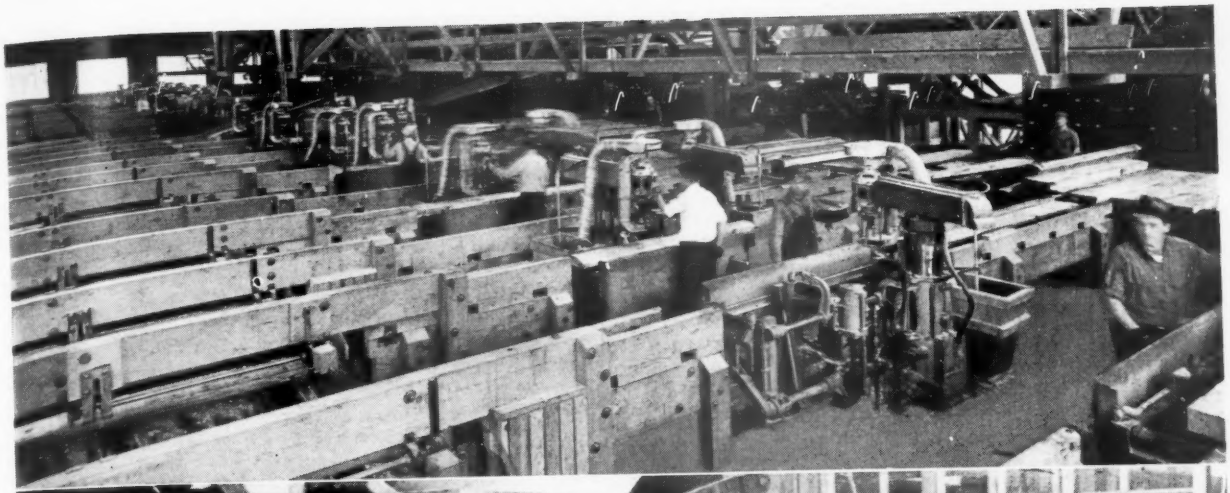
The Chippers

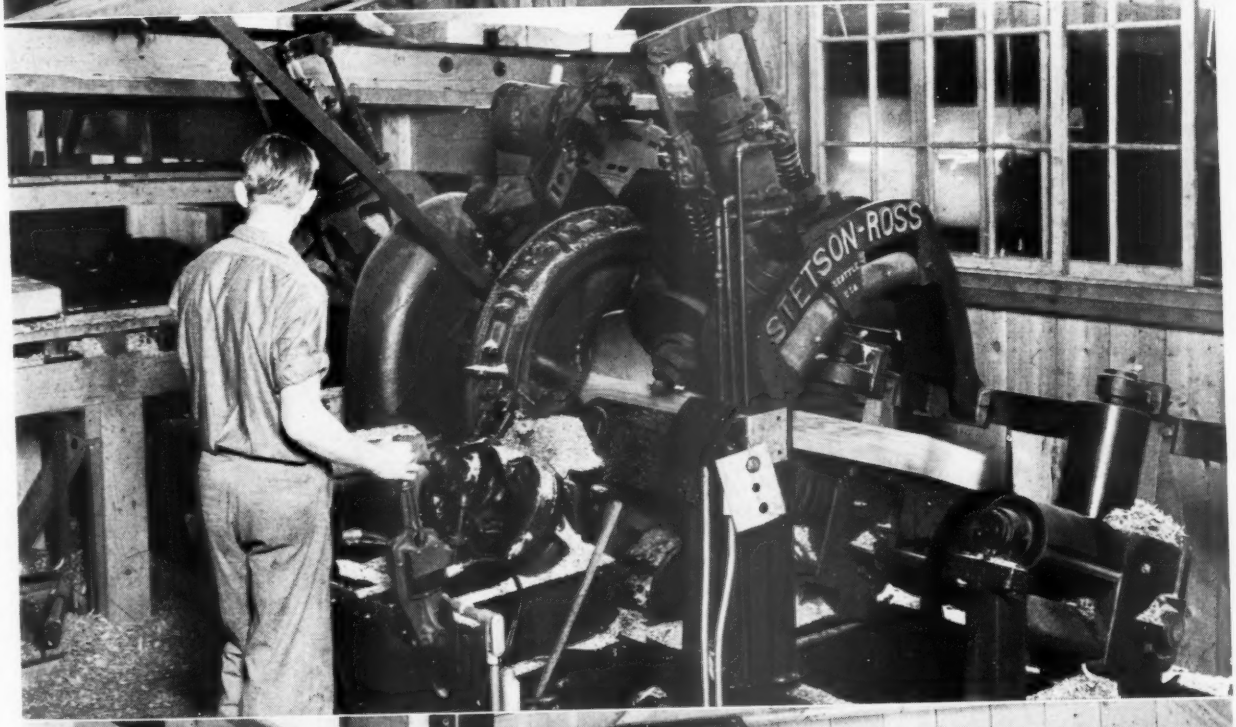
In these Sumner chippers only one cant is cut at a time. The spout is of special design and is made of extra heavy chilled iron. One base and one side angle have a micrometer adjustment for adjusting the clearance between the disc knives and the anvil edge. Experience has dictated the angles at which the spout is arranged in regard to the face of the disc, and also the line of the arbor is that which has been found most efficient for cutting accurate chips with a minimum of power (150 h.p.). The angles at which the cants are cut together with the speed of the chipper (514 r.p.m.), breaks up the chips leaving almost no cards, practically eliminating slivers and producing but a small amount of dust.

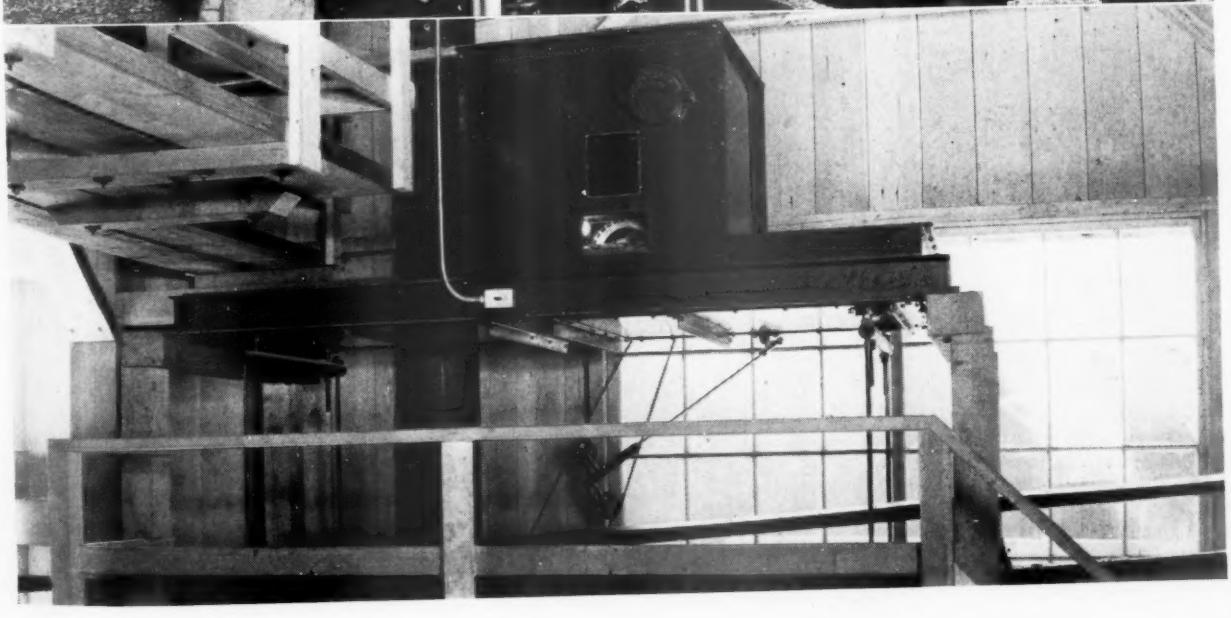
Each of the three chippers is driven by a 150 h.p. Westinghouse 80 per cent power factor, horizontal engine type synchronous motor turning at 514 r.p.m. The rotor is directly mounted on the chipper arbor extension with a tapered fit.

The base of each chipper is a one-piece heavy box section iron casting machined to receive the spout, bearings and motor stator. The base is made with a long extension in the way of this motor, per-

At the top, a general view of the wood cleaning plant showing the 24 knot borers, the cant transfer equipment, and in the background, one of the four machine barkers. In the center, one of the machine barkers in operation. At the bottom, one of the seven Weightometers. This one weighs hogged wood refuse from the wood cleaning plant. Below, the hand barkers, employed for cleaning slabs.




STETSON-ROSS



mitting the withdrawal of stator from the rotor in a straight line thus preventing injury to coils during withdrawal.

The chippers all have a bottom discharge. The discs are heavy cast steel fitted with renewable wearing plates, knife carriers and knife guards, eliminating wear from the disc itself, and making it possible to maintain the original true machine surfaces of the disc and insuring continuous cutting of uniform length chips.

Uniformity in chip length is an important factor in production of a quality pulp.

The bearings are all tapered roller bearings of the heavy duty industrial type. The bearing next to the spout is securely anchored to take the thrust load. The bearings on the opposite end are permitted to float to take care of expansion and contraction. The tapered bearings can be adjusted to such close tolerances as to practically eliminate end play of the arbor. In this way close and exact clearance is maintained between the anvil and the chipper knives insuring clean cutting and minimizing breakage. The bearings are mounted in self-aligning housings. The outer face of the housings are spherical turned with a corresponding spherical bore of the bed plate which secures perfect alignment and even distribution of the thrust load over all the bearing rollers.

Bearing inclosures are protected by a double labyrinth seal preventing loss of lubricant as well as contamination of the lubricant from outside.

The type of bearing mounting employed makes it possible to remove the disc and arbor assembly from the base without disturbing the bearing clearance or the grease pack.

Chip Screens

From the chippers a two section chain conveyor passes them onto a belt conveyor which discharges into hoppers above each of the four Sumner shaker type chip screens. The hoppers are of sufficient capacity to take care of peak loads coming from the chippers and continue to distribute the chips to the screens at a uniform rate eliminating the possibility of overloading the screens.

Slivers, splinters and oversize chips shake off into one conveyor which goes to the chip crusher. The correct size chips shake off into another belt conveyor, and the sawdust drops into another refuse conveyor. After the oversize chips pass through the crusher they return again to the screens.

Conveying and Weighing

The correct size chips pass on a belt conveyor over a Merrick Weightometer which automatically records and totals their weight, and then by belt up to the top of the chip storage building where they are automatically distributed into any or all of the three separate storage bins.

All refuse from the wood preparation plant is gathered by chain conveyors and deposited on one main conveyor which carries it to a "hog" which turns it into hogged fuel for the power plant. From the hog a belt conveyor takes the waste over a Merrick Weightometer and into the hogged fuel storage building.

Through the use of the Weightometers on the chip and hogged fuel conveyors the mill operators know what proportion of the wood coming from the log breakdown plant is going into chips and what proportion into waste for fuel. Further, the wood preparation plant is credited through the Weightometer record with the fuel its operations supply to the boilers.

Also, exact knowledge is obtained of the amount of chips in the chip storage building.

At the top, to the left, the three 72-inch chippers. At the right top is the 445-foot chip conveyor conveying chips from storage to the digesters. The photograph was taken from the top of the digester building, looking down.
In the center one of the twelve cross conveyors on the ground floor of the chip storage building, showing the rotary method of delivering chips from storage.
At the bottom is shown the method of filling the digesters through a tripper.

The chip screen hoppers, feeders and belt conveyors in the wood room were furnished by the James Brinkley Company of Seattle. The belt conveyors were equipped with Hewitt Maltese Cross rubber conveyor belting and the Chain Belt Company's anti-friction rolls and drive chain. Power from the Westinghouse motors is transmitted through Western Gear Works speed reducers. The cant transfer equipment was built by the Sumner Iron Works of Everett.

Control Methods

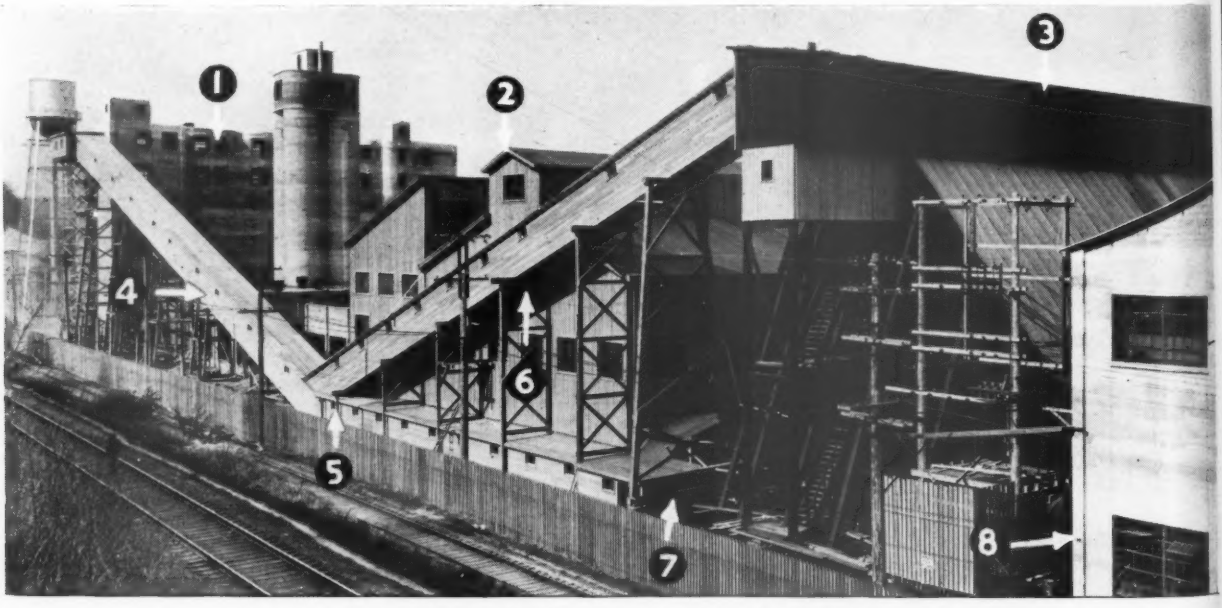
The laboratory makes and records moisture determinations of both chips and hogged fuel at significant intervals to assist the operators in controlling the processes.

The wood preparation plant was built with the knowledge that most of the dirt in pulp comes from the wood. Knowing that, the plant was designed along new lines aimed to turn out chips of maximum cleanliness, of uniform size and with a minimum of waste.

STORING and CONVEYING CHIPS

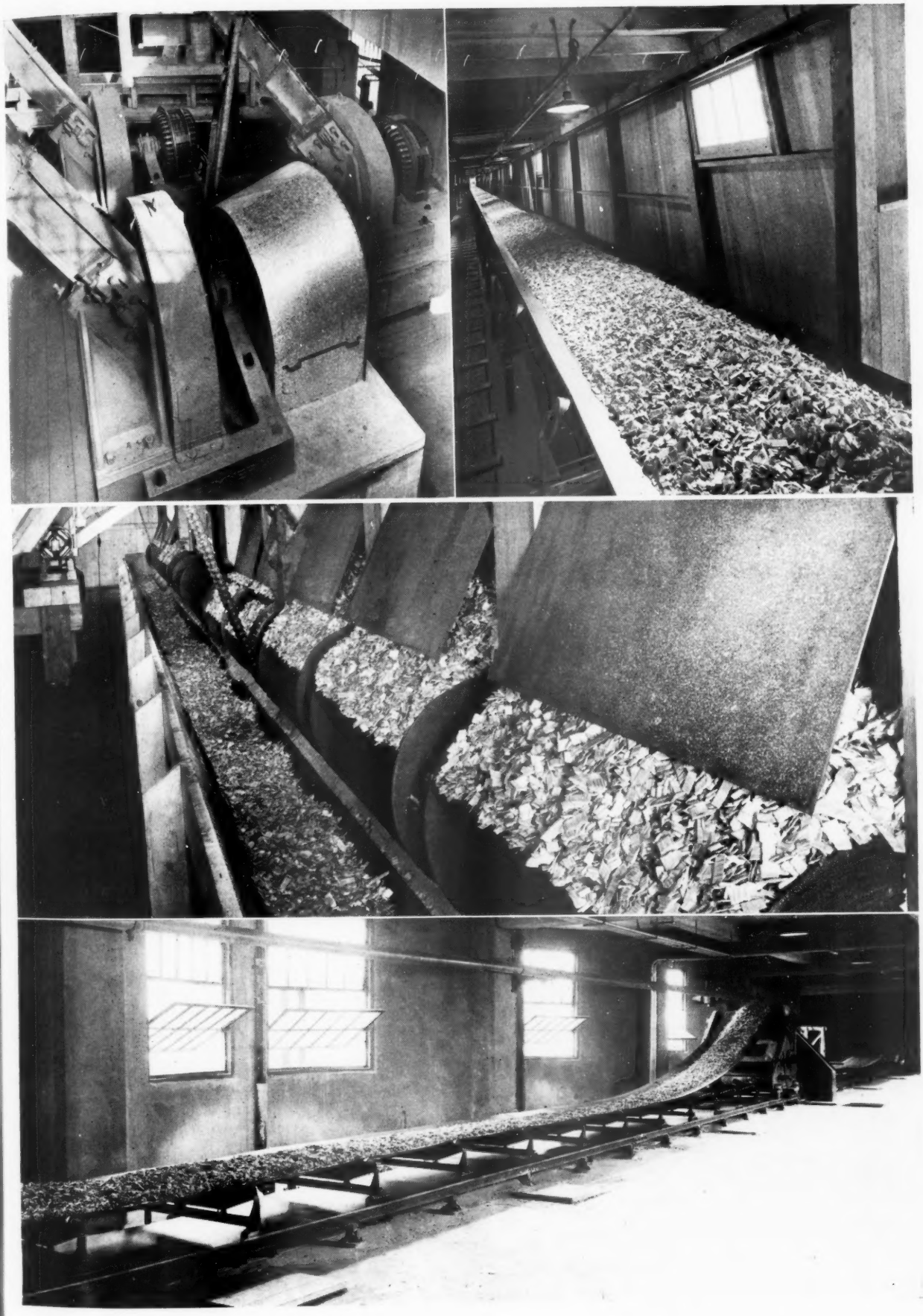
The method and design of the equipment used in storing chips and feeding to the digesters is similar to that employed successfully in the Weyerhaeuser Longview pulp mill.

Until Mr. Schoenwerk designed his first pulp mill on the Pacific Coast the common practice was to place the chip storage bins directly above the digesters. This method was expensive and unsatisfactory.



THE FLEXIBLE CHIP CONVEYING SYSTEM

The flexibility of the chip conveying system at the new Weyerhaeuser unbleached sulphite pulp mill is shown in the above photograph. No. 1 is the digester building. No. 2 is the chipping plant. No. 3 is the chip storage building with the filling conveyor at the top. No. 5 is the point where chips are discharged from the chipping plant onto conveyor No. 6 going to chip storage, No. 3.
Chips are taken from the bottom of the storage bins by conveyor No. 7 and transferred to conveyor No. 4 which carries them to the digesters. No. 8, a corner of the boiler house and power plant.



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It required extra heavy construction of the digester building to support the weight of the chips on top, and the capacity of the bins was insufficient. Continuous cooking in the digesters was too closely dependent upon the steady operation of the wood preparation plant.

To reduce the cost of constructing the digester building and to provide larger chip storage capacity for emergencies, the chip storage building was placed on the ground and connected with the digester building by fast moving belt conveyors.

The chip storage building, which holds four days' supply, is of unique wood construction, as will be noted in the photographs. It is divided into three separate storage bins lined with matched flooring. From the screens the chips are taken by belt conveyors to the top of the chip storage building where they are uniformly distributed into each of the three bins by a Link-Belt tank type self-propelling tripper. The method of distribution assures proper blending and moisture equalization of the chips.

These storage bins are fitted at the bottom discharge outlets with twelve lines of rotary feeders, four at the bottom of each bin. The revolving feeders deposit the chips onto twelve cross belts each 24 inches wide (see photograph), which in turn discharge onto a 42-inch main belt conveyor which serves as a gathering conveyor for the chips from the cross belts.

The four feeders at the bottom of any particular bin operate at the same time, so it is possible to put white fir chips into one bin and hemlock into another, thus permitting the cooking treatment best suited to a particular type of wood.

This chip discharge system was manufactured and installed by the James Brinkley Company of Seattle, who employed the Chain Belt Company's conveyor rollers and drive chain, the Hewitt Rubber Company's Maltese Cross rubber conveyor belting and skirting, and the Western Gear Works Drive units.

From the 42-inch gathering conveyor on the ground floor of the chip storage building the chips are delivered onto an inclined belt conveyor, 445 feet long, which carries them to the top of the digester building, one floor above the digester operating floor, where the chips are turned over to another 42-inch belt conveyor running the full length of the digester building.

This latter belt is equipped with a Link-Belt tank type tripper of the self-propelling type, which is fitted with a spout to discharge through the floor directly into the chute filling a digester.

These 42-inch belt conveyors operate at a speed sufficient to fill a digester in less than 15 minutes.

Link-Belt supplied the conveyor idlers and belting for the 445-foot inclined conveyor and for the cross conveyor at the top of the digester building. On the long inclined conveyor Link-Belt installed several of their self-aligning anti-friction bearing troughing idlers which automatically keep the heavily laden belt centered on the rollers.

Through electrical controls the operator in the digester building regulates the flow of chips from the chip storage building into the digesters, selecting the particular bin from which the chips are taken.

As the chips drawn from chip storage and conveyed to the digesters pass over a Merrick Weightometer, the digester operator has a record of the weight of the chips going into each digester, another example of the close control exercised in operating this new Weyerhaeuser pulp mill.

In the numbered photograph of the chip conveying system it is of interest to note that waste space in the wood preparation plant, in the chip storage building and at the top of the digester building, has been eliminated by extending the discharge points of the conveyors outside of the buildings.

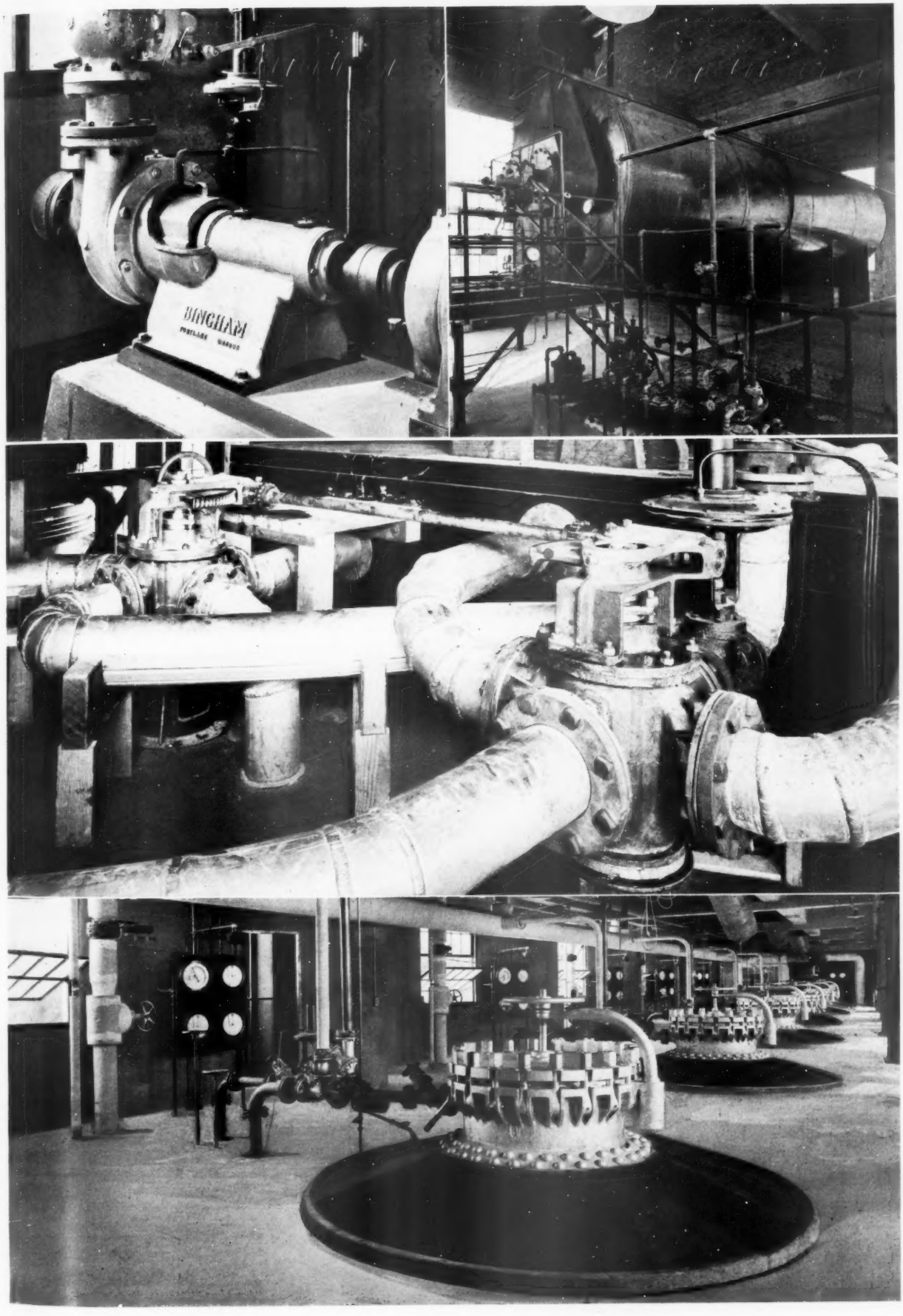
GERALD F. ALCORN
Technical Director
Everett Pulp Mill

ORVILLE E. FOX
Chief Accountant
Everett Pulp Mill

On the opposite page at the right top is the spray sulphur burner with the melting pit alongside. At the upper left is one of the new type, end discharge, stainless steel acid pumps.

In the center is a part of the acid plant showing lead pipe and two of the stainless steel valves.

At the bottom of the page is the digester operating floor showing the six digesters and the instrument panel for each. Note how the chip chutes are raised out of the way.


BINGHAM

ACID MAKING

Sulphur from the Freeport Sulphur Company's mines on the Gulf of Mexico is received at the mill by freighter, several thousand tons at a time. It is unloaded from the hold of the ship by clam shell bucket into a hopper supported on wheels, which is placed opposite the hatch to be unloaded.

A feeder at the base of the hopper discharges sulphur at a uniform rate onto Link-Belt portable sectional belt conveyors operating in tandem. These in turn discharge the sulphur onto a fixed 18-inch wide belt conveyor, 726 feet long, which runs in a straight line to the top of the concrete sulphur storage building. At the start of this long conveyor the sulphur passes over a Merrick Weightometer which automatically records the weight of the sulphur unloaded and stored.

Sulphur is discharged into each of the six overhead storage bins by a Link-Belt tripper. The capacity of this ship to storage unloading system is approximately 75 tons of sulphur per hour.

From the bottom of each of the six separate sulphur storage bins sulphur is drawn off in rotation, as it is needed in the acid plant, by the special feeders driven by Link-Belt motorized speed reducers with chain drives. Each feeder is located directly over the 18-inch belt conveylor which discharges the sulphur into a 12-inch diameter screw conveyor operating on a slight incline. The screw conveyor delivers the sulphur directly into the melting pit.

All of the sulphur handling equipment was furnished by the Link-Belt Company's Seattle office.

The movement of the sulphur from storage into the melting pit is handled by the acid plant operator through electrical controls.

Chemico Sulphur Burning Equipment at Everett Mill

The Chemico sulphur burning furnace installed at the Everett unbleached sulphite pulp mill of the Weyerhaeuser Timber Company is a modification of the equipment originally developed by the Chemical Construction Corporation of New York City for use in contact sulphuric acid plants. The Chemico organization, since its formation in 1914, has specialized in the design and erection of sulphuric acid plants, at first for the fertilizer industry and later for all branches of chemical industry. For these plants it naturally sought the most improved type of sulphur dioxide producing apparatus.

The sulphuric acid plants constructed in the period from 1920 to 1925 employed, with one exception, the lead chamber process and for those the Glens Falls Rotary Burner, commonly used in paper mills, was very satisfactory. That one exception, however, used the contact or catalytic process and in the operation of that plant it was soon apparent that great advantages could be obtained if pre-dried air could be used for the combustion of the sulphur in order to produce a sulphur dioxide gas that would not require subsequent drying. Obviously the use of pre-dried air would require a gas type furnace and the study of this problem resulted in the development of the modern Chemico spray sulphur burner and furnace.

The first commercial installation of this equipment was incorporated in the initial Chemico Vanadium Catalyst type of contact sulphuric acid plant erected at Baltimore in 1927. This installation, after some slight modifications, was entirely successful and is still in regular use burning approximately 17 tons of sulphur per day. Since then, the Chemical Construction Corporation has installed 24 of these sulphur-burning furnaces with a combined capacity of over 600 tons of sulphur per day, in connection with contact sulphuric acid plants, and has 5 additional installations under contract at present.

The only important difference between the Chemico sulphur furnace as installed for sulphuric acid manufacture and that installed for use in sulphite pulp mills arises from the different strength of gas required. Sulphuric acid manufacture requires a gas containing around 8 per cent SO_2, while the pulp industry wants a gas strength of 18 per cent. This difference in requirements affects only the size of the furnace and the nature of the materials used in its lining.

The furnace installed at the Everett pulp mill consists of a horizontal cylindrical steel shell 10 feet in diameter by 32 feet long, lined with high-grade insulating brick and fire brick. The burners, which deliver sprays of molten sulphur, are inserted through suitable openings in one of the circular ends. Air for the combustion enters this same end, through annular openings surrounding the burners, under forced draft from a blower. As the blower handles only ordinary air, it need not be built of corrosion-resisting materials. The sulphur dioxide gases leave through a flue at the opposite end from the burners. Baffle walls inside the furnace insure complete combustion and mixing of the gases.

The spray burner (U. S. Patent No. 1,844,653, Feb. 9th, 1932) is essentially a steam-jacketed pipe conveying the molten sulphur with a small orifice at the end projecting into the furnace and an elbow connection on the other end. Inside the pipe, at the orifice end, is a moveable spiral fastened to a rod which extends back through the pipe and projects out through a stuffing box in the elbow. This permits adjusting the position of the tip of the spiral with relation to the orifice without removing the burner from the furnace or ceasing operations. It also permits using the spiral to clear the orifice of any particles of foreign matter in the sulphur that might become lodged in it, though ordinarily all such particles are removed before the sulphur reaches the burner.

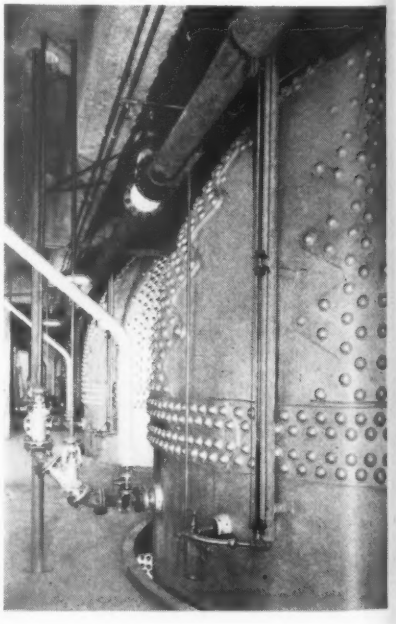
The sulphur is melted in a concrete pit, located to one side of the furnace, by means of steam coils. Pumps, connected by steam-jacketed piping to the burners, are immersed in molten sulphur. The pump intakes are screened and about midway down in the pit. Any sand or heavy dirt present in the sulphur settles in the bottom of the pit from where it is periodically removed by long handled scoop shovels, while any light dirt floats on the surface of the molten sulphur and is periodically skimmed off, so that only clean molten sulphur enters the pumps for delivery to the burner. By automatic regulation of the steam supplied to the melting coils, the temperature of the molten sulphur is held around 250 degrees F., which is below the temperature at which it would thicken and become difficult to pump. Difficulties inherent in the use of small reciprocating pumps for molten sulphur led to the development of a special Chemico small submerged centrifugal pump for this service. This pump is driven by a small steam turbine so as to permit close variation in speed. As valves in steam-jacketed sulphur lines have numerous disadvantages, each sulphur burner is connected to an individual pump.

The amount of sulphur handled by a burner may be varied by changing the speed of the centrifugal pump or by changing the size of the orifice in the burner tip. Special equipment has been incorporated in the Weyerhaeuser installation to control the speed of the sulphur pumps by the temperature of the gases leaving the furnace so as to insure a constant SO_2 content in these gases.

Where cheap steam is not available for melting and pumping the sulphur, a waste heat boiler may be installed to generate steam from the heat contained in the sulphur dioxide gas. This is the ordinary practice at sulphuric acid plants, but was not necessary in the Everett installation.

The Chemico burner and furnace has the advantage over the types of sulphur furnaces generally used in the pulp industry of permitting the supply of sulphur dioxide gas to be stopped almost instantaneously by stopping the sulphur pump, since there is no pool of unconsumed molten sulphur in the furnace to be burned before the gas flow ceases. This is of great importance in the event of trouble in the sulphur dioxide using equipment necessitating a sudden cessation of the gas supply.

The advantage from the fact that the blower handles only air has already been pointed out, as has also the possibility of automatically maintaining a constant strength of SO_2 gas closely approaching the theoretical maximum. Dilution of the gas is prevented since the entire system is encased in steel, and the full concentration of sulphur dioxide is therefore delivered to the absorption equipment. Furthermore, by the use of a high pressure blower, this type of furnace can deliver the gases at any desired pressure. This furnace can, therefore, be used with a pressure absorption equipment without an auxiliary booster blower,



At the right the system of side relief valves and piping is pictured.

thus permitting the production of strong sulphite liquor even under unfavorable climatic conditions.

Foxboro recording pyrometer and potentiometer Stabilog control equipment is installed on the spray type sulphur burner, controlling temperature of gases leaving the burner, through control of speed of turbine driven sulphur pumps. Close control of the sulphur burner is essential, to avoid production of SO_3 presence of which in more than minute quantities is undesirable in the cooking liquor.

From the burner the SO_2 gas passes through coolers of the water cooled surface type and on to the Jenssen acid towers. A portion of the gas is bypassed through a pressure blower to the pressure tower. This blower is of stainless steel and was designed and manufactured by the Bingham Pump Company of Portland. The castings were made by the Electric Steel Foundry Company of the same city.

As the blower supplying air to the sulphur burner produces a positive pressure of about 10 inches of water on the entire system, there is no necessity for a gas fan in the acid system.

The regular mill pressure is sufficient to carry water to the top of the weak Jenssen acid tower without pumping, but to insure uniform flow a Foxboro Stabiflo controller is used. Acid from the weak tower is pumped to the top of the strong tower. From this tower the acid flows into a sludge tank from which it is pumped through the pressure tower before going to the filters.

Acid tanks are of wood stave construction. The sludge tank is 16 feet in diameter and 12 feet high. The four acid filter tanks are each 12 feet in diameter and 9 feet high with 30 inches of sand as the filter medium. The clearwell is 6 feet in diameter and 11 feet high.

The acid plant has been equipped with a new design of acid pump, in which the Eingham Pump Company (all of the acid pumps are Bingham) has incorporated a special rotating element designed to handle strong acids without becoming gas bound. The acid pumps are made of special alloy heat treated steels, cast by the Electric Steel Foundry Company, which together with special stuffing boxes, and acid and moisture proof bearing cylinders, reduce maintenance to a minimum.

Valves used for cold acid in the acid plant are of acid resisting bronze.

Piping in the acid plant is entirely of lead. The Northwest Lead Company of Seattle furnished and installed 100 tons of lead pipe and lead sheets in the acid plant.

While practically all pipe and sheet lead was made with 6 per cent antimonial content, there are a number of locations where severe conditions from corrosion or heat, or from both, made it advisable to use the new tellurium antimonial lead alloy. This alloy, on account of its increased resistance to corrosion, its greater tensil strength and resistance to creeping action, was specified for the tough spots.

Tellurium alloy is employed in the 8-inch tees of the gas cooler, which connect the leads to the gas cooler from the cast iron header of the sulphur burning equipment. All other lead in the cooler is 6 per cent antimony lead. All elliptical and other sizes up to 12 inches, inside diameter, are seamless drawn with special dies and mandrels to insure uniform wall thickness and standard cross section.

Antimonial lead lines, 20 inches in diameters, carry the cooled gas to the Jenssen towers, and 6-inch lines carry the water to the acid towers. The acid recovery tower, the acid filters and the acid storage are served with hard lead lines. The sewer system for the acid plant is made from 10-inch antimonial lead ¼ inch thick.

All bends and sweeps were designed with the idea in mind of reducing friction resistance to a practical minimum. All joints and seams were burned inside and out to insure maximum service.

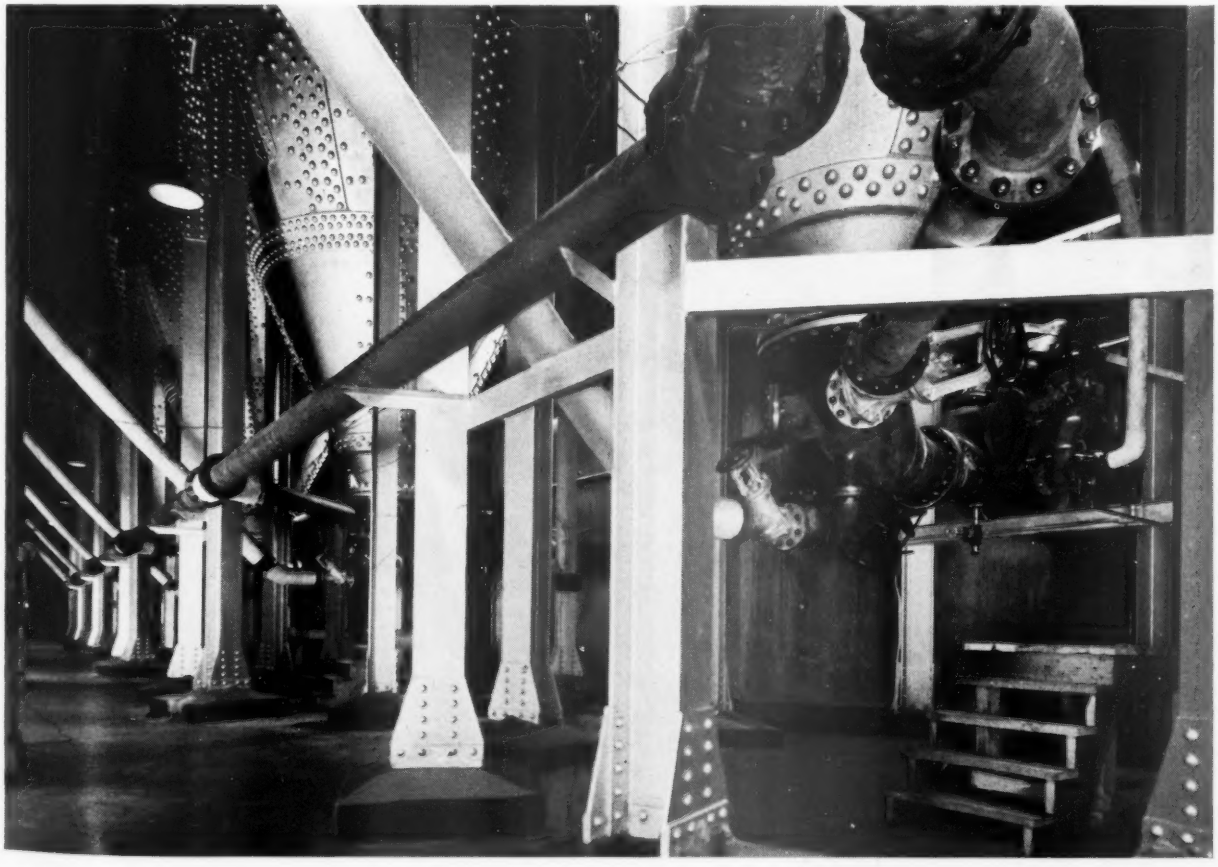
In a number of places lead handles special problems. Fifteen 24-inch diameter ⅜-inch wall elbows and return bends used on wood stave lines to the gas condensing towers were made from sheet lead. Hard lead 8-inch spray heads were built to specification to handle stock washing in the blow pits.

A high pressure line in the acid recovery system was made from tellurium antimonial alloy to carry the extra load at minimum cost.

Volume of water to the Jenssen acid towers is controlled by two Foxboro flow Stabilogs which actuate 3-inch and 4-inch Stabilflo valves.

All four acid towers have chemical stoneware linings installed by the Stebbins Engineering and Mfg. Company. The lining consists of 9-inch by 18-inch tile, with suitable shapes for forming the domes, laid in a litharge composition joint material.

Below is the ground floor of the digester building showing the stainless steel fittings, the stainless steel pipe and the six digesters.



The Gas Recovery System

As part of the acid making arrangement a blow pit gas recovery system has been devised which contributes to economy in the production of acid for cooking and prevents the escape of blow off gases from the mill.

Located alongside the digester building and next to the blow pits are three condenser towers which take the place of the usual vomit stacks. These towers of wood stave construction are 12 feet in diameter and 82 feet in height. A top of wood is set below the sides and covered with water to insure tightness. The towers are filled with chemical stoneware absorbing tile for 15 feet up from the bottom.

Gas from the blow pits enters these towers at the bottom and meets cooling water sprayed in from the top. The amount of water is controlled by a Foxboro temperature Stabilog which automatically maintains the temperature of the water leaving the towers at the bottom at slightly below the boiling point of water at atmospheric pressure. This temperature is high enough to prevent sulphur dioxide from being carried off by the condensing water. The cooled gas of a composition between 80 and 90 per cent sulphur dioxide leaves the towers at a temperature practically the same as the entering cooling water.

The cooled gas is piped to the gas absorption towers which are 8 feet in diameter and 110 feet in height. One tower is packed with limestone and the other with spiral chemical stoneware tile. These two gas absorption towers are alongside the two Jenssen acid towers and the same elevator supplies lime rock for the SO_2 recovery system and the Jenssen acid system.

Water flows through the towers counter currently to the gas, and the acid made is approximately 1 per cent combined SO_2 and 6 per cent free SO_2. It is collected in a dribble tank of wood stave construction 20 feet in diameter and 12 feet in height.

The acid is stored in the dribble tank and fed slowly into the acid sludge tank where it mixes with the acid from the regular towers. Acid is made in the gas recovery system only while a digester is blowing.

THE COOKING SYSTEM

Essentially, the digester system and equipment are the same as in the Weyerhaeuser bleached sulphite pulp mill at Longview, but there are variations in the size, the layout and in other details. These differences arise partly from the experience of the Longview mill and partly from the fact that unbleached sulphite is made in the Everett mill.

The six digesters at Everett are each 52 feet high and 17 feet 6 inches in diameter, and they are of 1¾-inch steel plate, designed for a working pressure of 150 pounds per square inch. It will be noted in the photographs that the bottom cone is longer than in the usual sulphite digester. This design gives better circulation and cleaner blows.

Each lined digester has a volume of 7,276 cubic feet, slightly larger than those in the Longview pulp mill and will average slightly in excess of 15 tons per blow.

The Willamette Iron & Steel Corporation of Portland, Oregon, rolled the heavy 1¾-inch steel plate for the digesters and completely erected all six digesters on their shop floor before re-erecting them on the mill site in Everett. By this procedure Willamette insured the perfect matching of all the plates when erected on the job.

The same method was followed with the two spherical acid accumulators of 1⅛-inch steel plate, which have an inside diameter of 30 feet when lined and a volume of 12,310 cubic feet.

Before the building was erected around the digesters, the shells were lined by Stebbins Engineering and Mfg. Company. The specifications covering these installations embody new departures in the art and provide for various changes in the cooking liquor as well as for the increased pressure under which these digesters will be operated.

The two thirty-foot spherical accumulators were lined by Stebbins Engineering and Mfg. Company before the building was erected around the shells. These linings are eight inches in thickness and are designed to withstand cooking liquors of various bases.

The six sulphite digesters in the new Weyerhaeuser Everett pulp mill, were erected and lined before the building was constructed around them.

Instrumentation

Each of the six digesters has a separate instrument panel upon which is mounted a Foxboro pressure recorder and controller, a Foxboro steam flow meter, a Foxboro liquid level gauge and a Leeds & Northrup Micromax temperature recorder.

The main steam control instruments, the accumulator pressure control, the temperature recorder and the liquid level gauges are similar to the Longview mill.

Mounted on the acid control panel are the controllers for maintaining desired pressures in the high pressure and low pressure accumulators, and a temperature Stabilog controlling the heat exchangers on the Chemipulp accumulators, which insures uniform temperature acid for filling the digesters. The relief gas and relief liquor header pressure recorders also are mounted on this panel.

The master steam panel comprises a Foxboro Universal Flow Meter, and the controller actuating the Mercon desuperheating valve, and the usual pressure recorder.

Pressures in the digesters are controlled by reactor-type recorder-controllers actuating 3 inch Stabilflo valves in the top relief lines. With some minor modifications this is the same system which has been in such successful operation during the past five years in the Weyerhaeuser bleached sulphite pulp mill at Longview.

Uniformly Cooked Fibre

The system wherein digester pressures and steam flow are controlled entirely independent of each other has been proved to have a marked effect in producing uniformly cooked fibre, and the uniformity of circulation induced by this

system should be enhanced to an appreciable effect by the unique design of the bottom cones on the digesters.

Exact knowledge of the height of acid in the digester throughout the entire cooking cycle is recorded on the chart of the special liquid level gauge which is installed on each digester. Knowledge of the liquor level is essential in maintaining the desired gas space in the digester, and the adoption of these recorders, in conjunction with sight glasses, is in line with the general policy of so equipping the entire mill that records of all stages of the operation will be available.

The system of relief, in connection with the Chemipulp Process, differs from the Weyerhaeuser Longview mill installation.

Motor Driven Blow Valves

To more effectively control the blowing of the digesters in connection with the SO_2 gas recovery system, each digester has been equipped with a motor driven stainless steel blow off valve. A one h.p. Westinghouse motor operates each valve.

Chip Testing

The chip drying oven is located on the top floor or the chip conveyor floor. The design includes forced draft instead of natural draft for the drying of chips. Chip moisture tests are run on each digester.

Materials

Every effort has been made to provide the most suitable material in the cooking system. All acid piping is of KA2 stainless steel Centricast pipe, manufactured by the Michigan Steel Casting Company, who are represented on the Pacific Coast by the R. E. Chase & Company of Tacoma. Some acid valves are KA2MO and some are of KA2SMO, and were cast by the Electric Steel Foundry of Portland, whose trademark name is ESCO.

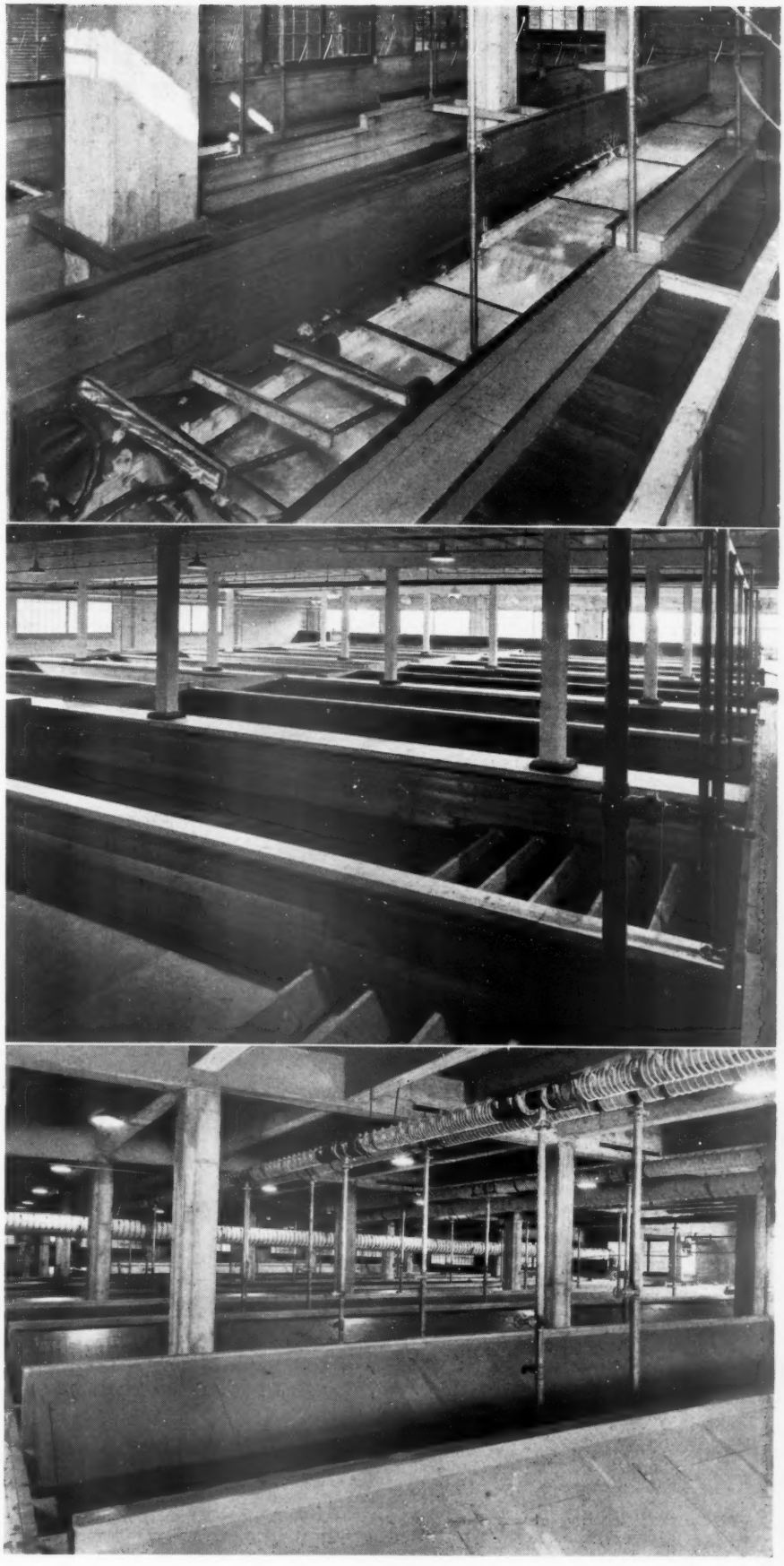
Esco stainless steel is used for all valves and fittings on the six digesters and two accumulators, as well as for all fittings through the shells, the top and bottom neck liners and cover liners. The Doran valves were made of ESCO steel, alloy 45. The angle valves were made of ESCO stainless steel, alloy 45, and fabricated by the Doran Company of Seattle.

The blow valves are also of ESCO stainless steel, alloy 45, and were fabricated by the Washington Iron Works of Seattle. Control valves are of the same material and were supplied by the Foxboro Company in connection with the installation of their instruments.

All acid pumps were built by the Bingham Pump Company of Portland, and were cast in stainless steel by the Electric Steel Foundry Company of that city.

Trouble free operation coupled with economy will be result of using stainless steel of a proved formula for all piping, valves, fittings and pumps.

The equipment of the Everett pulp mill cooking system will, because of the higher working pressures used, make possible the use of stronger acid than in the ordinary sulphite pulp mill . This results in lower cooking temperatures.



At the top is the knotter room showing the three rows of flat screen knotters. In the center, the riffler room, and at the bottom, the flat screen room.

BLOW PITS and KNOTTERS

Each of the three blow pits is of wood stave construction, 40 feet in diameter and 28 feet in height. The heavy wood roof is supported by trusses and is housed over.

Stainless steel drainer bottoms and targets are used in all three blow pits. Upon the conclusion of the blowing from the digester, the blow pit lid is removed and the stock is leveled with the monitor, the pit drain valve having been opened five minutes after the start of the blow. The pit is then flooded with white water and the stock is normally washed for two hours.

When the washing in the pit is finished, the drain valve is closed, and the breaker water line to the stock valves is turned on to facilitate the opening of the stock valve. The blow pit showers are opened up and the automatic monitor is set to rotate. Then the stock valve is opened and the stock is sluiced out of the pit into the blow pit sump.

A white water dilution line discharges into the stock spouting leading to the knotter. Its flow is controlled by a Leeds & Northrup Micromax consistency controller, which was developed by the Research department of the Weyerhaeuser Pulp Division in Longview. This consistency regulator is adjusted so that the stock flowing to the flat screen knotters will be maintained at a consistency of approximately 0.7 per cent. This flow is by gravity.

The Knotters

There are three rows with three 14 plate screens each of Impco knotter screens using screen plates of .030 inch cut. At this point a sample for the photo-electric cell consistency regulator is taken out of the flow boxes on the side of the first screen section in the first row of screens.

The knotter screens are arranged so that each succeeding screen section in each row is 6 inches below the previous section to allow for showers at the head. The showers carry the knots and hard pieces down the screen line to the end where they are collected and pumped to a thickener and a screw press before being taken to the boiler house to be used for fuel.

The stock from the knotter screens is collected in a sump from which it is pumped to the top of the knotter building by two Bingham vertical stock pumps driven by Westinghouse type CS induction motors of 75 h.p. each.

On the top floor of the knotter building the stock is washed and thickened in an IMPCO (Improved Paper Machinery Corporation) washer, which has a drum 8 feet in diameter and 16 feet long. It is covered with 40 mesh stainless steel wire cloth. There are 4 shower rows with alternate 19 and 20 showers to a row. A double water leg 25 feet high provides suction.

BLENDING, RIFFLING and SCREENING

After the stock is washed and thickened it is diluted to 2.5% consistency by means of a consistency regulator and then pumped to the six stock blending tanks, each of which is 30 feet in diameter and 30 feet in height.

The Six Way Stock Valve

Delivery of the stock into the six blending tanks is accomplished through a six-way valve which is shown in the photograph. The use of this valve as part of the unique stock blending system provides the maximum flexibility and practically perfect blending. Blending may be accomplished in any manner desired.

The valve, which is motor driven may be set for automatic operation with a train of time cams so the stock passing through the single port in the valve will be distributed into each of the six tanks for varying periods of time. Any one or several tanks can be shut off and the stock by-passed to the other tanks. This system will also permit a special cook to be kept separate from the other cooks.

The outlets are at the bottoms of the tanks and they all terminate in a blending tube of wood stave construction. From the blending tube the stock is pumped to a dilution head box to the rifflers, which are on the top floor of a concrete building housing the rifflers and the flat screens. Dilution water from the thickeners is used for concentrating the stock between the screen and the machine chest. This water flows along a flume until it overflows at a dam near the riffler head box. The water held behind the dam, at a constant head, mixes with the stock in a compartment below.

Consistency Regulation

Consistency of the stock entering the rifflers is controlled by the system developed at the Longview mill. The water valve for the constant head water is set and the stock valve is controlled to regulate the consistency to 0.30 per cent, which is the standard for riffling.

There are twelve rows of rifflers, each being 11 feet wide and 70 feet long.

The Flat Screens

From the rifflers the stock flows to the first section screen flow box and then onto five lines of screens. At the first section tail box it is pumped to the second section head box. The second section consists of three rows of screens. From the second section tail box the remaining stock is pumped to the tailings screens consisting of two rows, and then pumped to the tailings tanks. These tailings together with the rejects from the knotter screens are thickened by an IMPCO drum type thickener with a drum 5 feet in diameter. 10 feet long and covered with phosphor bronze wire. From the thickener the screenings are put through a screw press and sent to the boilers for fuel.

There are 48 IMPCO bronze vat flat screens, 14 plates each, driven by the Dunbar drive.

Screen Plates and Seal Rolls Chromium Plated

All pulp screens in the new Weyerhaeuser Timber Company's Everett mill are equipped with chromium-plated plates, similar plates having been used in their Longview mill for several years.

Satisfactory performance of chromium-plated screen plates at Longview, coupled with their investigation of more recent developments, led to the establishment of slot sizes finished to close tolerances. Further research and technical cooperation was given by William A. Hardy & Sons Company, plate manufacturers, and Chromium Corporation of America, who supplied the chromium plate.

Chromium plating provides a hard, durable protection against corrosion, and accurately maintains fine precision of slot dimensions, which is of essential importance to the Weyerhaeuser organization as a producer of high grade pulp.

Seal rolls of the Minton vacuum dryer at the Everett mill have also been chromium-plated by the Chromium Corporation of America. In this application the protection afforded by chromium plate retards wear and insures the proper vacuum seal as well as minimizes the pick up of lint from the pulp sheet as it passes through the seal rolls.

PUMPING

The screened stock, having been dewatered, is dropped on a white conveyor belt, supplied by the Link-Belt Company, and is carried to a sump from which it is pumped to the screened stock storage tanks. As the stock passes into these chests it is put through a consistency regulator which adjusts the consistency to the standard predetermined for screened stock storage.

From these tanks the stock is drawn into the machine chest. Agitators on the tanks keep the stock from settling and ready for use on the machine.

Pumping Without Basements

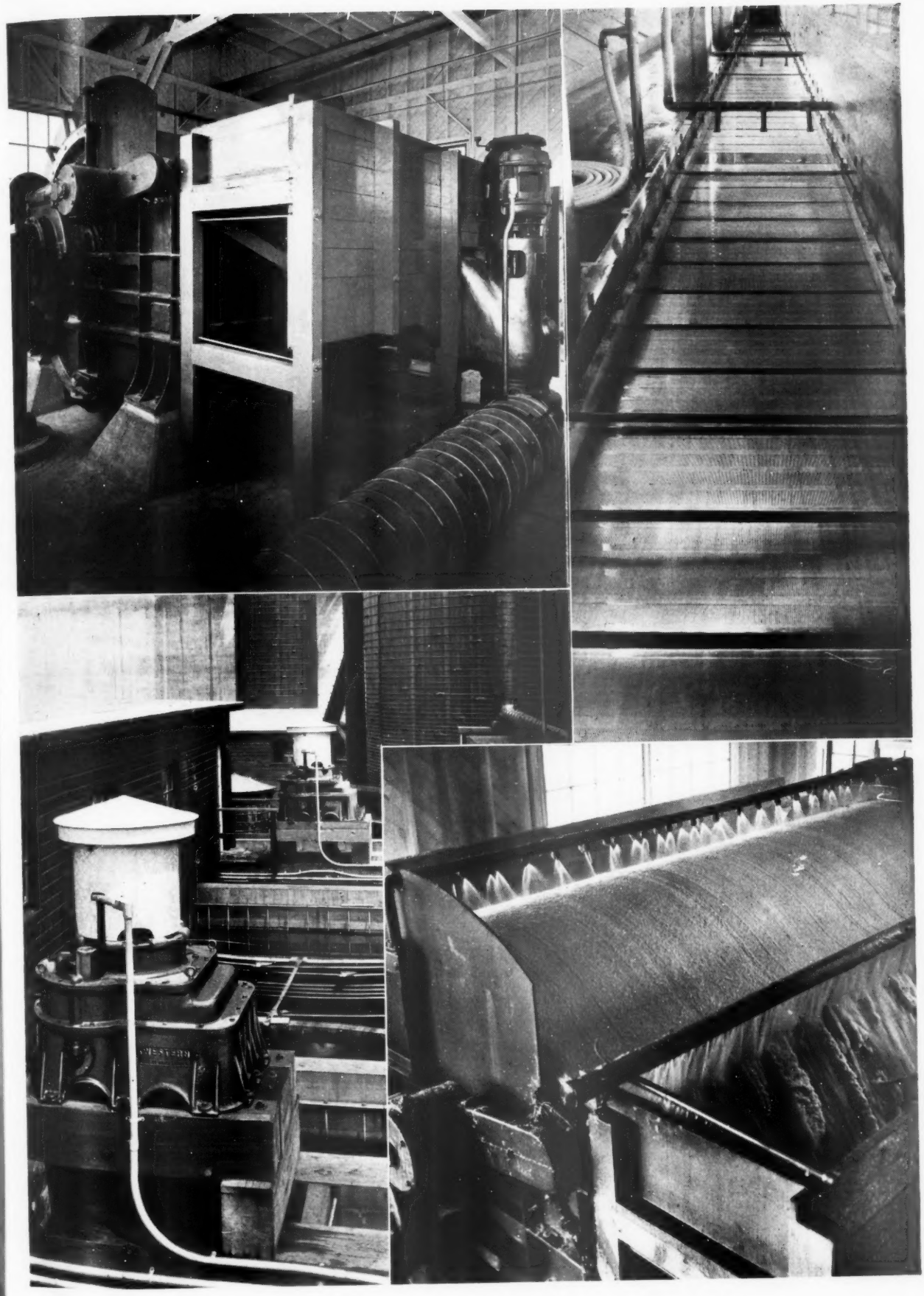
One of the interesting features of the Weyerhaeuser Everett pulp mill is the elimination of all basements. The mill at Longview was also designed to eliminate the basement construction. The pumping problem is completely changed by the absence of basements and it was necessary for new types of pumps to be designed to work out of sumps.

All of the pumping equipment used in the Weyerhaeuser pulp mill was furnished by the Bingham Pump Company of Portland, Oregon, which specializes in the design and manufacture of pumping equipment for the pulp and paper industry. In this new installation the Bingham company has introduced several new designs which are of interest.

The Bingham vertical stock and white water pumps have been designed to handle stock or white water, respectively, containing entrained air, without becoming air-bound. Due to this advancement in design, the vertical pumps require only small sumps to handle the entire capacity of the pulp mill. A typical installation of these vertical pumps is the white water sump in the screen room, which is shown in the photograph.

All stock pumps of either vertical or horizontal design are characterized by large suction openings and non-clogging impellers capable of handling high consistency stocks efficiently. The high operating efficiencies of these pumps are maintained by the adjustable rotating elements which have been provided so that any wear taking place between the

Two views of the stock washer and thickener, a view of one screen line with chromium plated plates, and a picture of two special gear reducers driving agitators on blending tanks.



impeller and the wearing plates can be taken up without replacing the wearing parts. This adjustment can be made without interrupting the operation of the pump.

The screen room pumps, of unusual design are termed Even Flow transfer pumps. They are of the vertical type and are installed in small sumps from which they take their supply of stock from the screens. The outstanding feature of the Bingham Even Flow transfer pumps is their ability to discharge with an "even flow" any amount of liquid entering the sumps, from a small fraction of their capacity to full capacity. The Even Flow pumps are proving of benefit in the efficient operation of the screens.

Throughout the mill, stock of high consistency is pumped directly from deckers or washers into the system, by means of vertical stock pumps which the Bingham Pump Company has developed for this special service. These pumps handle heavy stock coming directly from the doctor blades into the pump without becoming air-bound or clogged. The use of these special pumps has eliminated the necessity of dropping the stock into a chest and then pumping it back into the mill system.

A new type of vacuum pump has been developed by the Bingham Pump Company and is used throughout the mill, particularly on the wet end of the pulp drying machine. These pumps represent an advancement in design of vacuum equipment as they are of horizontal split case construction which permits inspection or removal of the rotating element without disturbing the lower half of the pump casing, the suction and discharge connections, bearing or motor. In addition, through the split case construction of the vacuum pumps, additional room space requirements for the axial removal of the rotating element has been eliminated.

Accessibility for inspection and repair has been given unusual importance by the Bingham Pump Company in the design of all the pumps employed in the new Weyerhaeuser pulp mill. The pumps are ruggedly constructed to minimize maintenance. Exceptionally high operating efficiencies have reduced the pumping horsepower consumption to a minimum.

Westinghouse motors drive all the pumps in the mill. Three 75 h.p. vertical splash proof synchronous motors, 80 per cent power factor, 1200 r.p.m. are direct connected to the large Bingham vertical pumps in the screen room.

THE MACHINE ROOM

Since the Minton Vacuum Dryer in the Weyerhaeuser bleached sulphite pulp mill in Longview began production in November 1931, the Pulp Division has studied its operation and has kept a very complete record of the results attained.

These studies resulted in the selection of the Minton Vacuum Dryer for the new Everett unbleached sulphite pulp mill. The choice of this type of drying machine was based upon its several advantages. Among them the following are of prime importance to both the producer and the buyer of high grade sulphite pulp.

The Minton will dry pulp to 100 per cent air dry or better with practically no loss of strength or color from that of the wet pulp, for the temperature at which the pulp is dried is lower than that of the open dryers. No dirt can get to pulp dried in a vacuum dryer because it is totally enclosed, and no outside air is used.

Another contribution to uniformity by the vacuum dryer comes from the ability of the operators to maintain complete technical control over the drying operation due to the dryers being totally enclosed. Constant pre-determined dryness of the finished pulp can be more easily maintained throughout the run.

At a moisture content to which pulp is usually dried (90 to 100%), vacuum dried pulp is more hygroscopic and will develop strength more rapidly than open dried pulp.

Built by Rice, Barton and Fales

The entire pulp drying machine was built by Rice, Barton & Fales, Inc., of Worcester, Massachusetts, with the exception of the suction presses and the cutter which were built by the Beloit Iron Works of Beloit, Wisconsin, and sold by Rice, Barton & Fales.

The machine is the same width as the one built by Rice, Barton & Fales for the Weyerhaeuser Longview mill, 156 inches in width, but differs in other respects The changes in the Everett machine which makes it different from the Longview one come chiefly from the experience of the Pulp Division.

The fourdrinier, which requires a wire 95 feet long, may be tilted to vary the formation of the pulp sheet. There are 54 rubber covered table rolls as compared with 48 in the Longview machine. Under the table rolls are Monel metal saveall trays to carry off white water without contamination, to the sump provided for it. The wire pit is lined with glazed white tile to prevent slime and dirt from accumulating.

The fourdrinier wire carrying the stock after passing over the table rolls crosses six suction flat boxes which are operated by an ingenious system.

The Broughton Unit Vacuum Control System

The Broughton Unit Vacuum Control System, controlling the vacuum on the flat boxes under the wire in the new Weyerhaeuser Timber Company pulp mill at Everett, Washington, allows every bit of vacuum pull exerted by the individual barometric legs to be put to practical use and only enough pull from the vacuum header is exerted to maintain a necessary condition. This new system eliminates the necessity of a flat box vacuum pump and is connected into the suction of the couch vacuum without affecting the vacuum carried on the couch, nor the power to drive the couch vacuum pump.

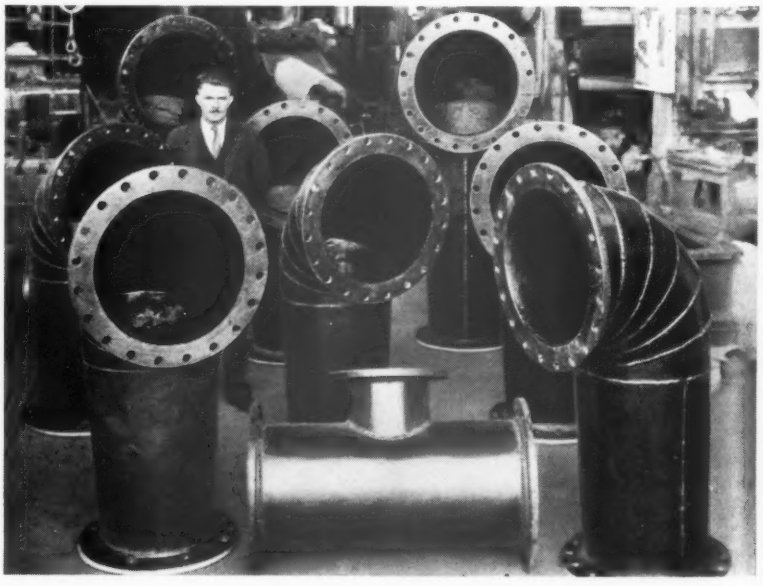
The Broughton Vacuum Controllers allow the pull from the suction header to be exerted on the box controlled, individually, to just the extent necessary to excite a certain amount of water to be drawn from the box. The air and water are separated; the water falling by gravity into a seal tank. The individual vacuum breakers, a function of the Broughton Vacuum Controller, enter air in controlled amounts into the boxes only, thereby diminishing enormously the amount of air handled as compared to all other systems now in use.

The vacuum on the flat boxes can be gradated to any degree that the operators require, and since each box is individually controlled, whatever happens to one box in the way of leakage, etc., has no effect whatever upon the rest of the boxes.

This new system is an invention owned by A. E. Broughton and Company of Glens Falls, New York, and is covered by United States Patent No. 1,962,477, dated June 12, 1934, and Canadian Patent No. 348,550, dated March 5, 1935. Many other foreign patents applied for. This new system has been installed successfully on 150 paper machines within the United States and Canada the last year and a half.

The Press Section

The wire passes around a Beloit suction couch roll upon which rides a rubber covered pressure roll, and the pulp sheet is picked up by the first felt and carried through a Beloit suction first press, and then through the two plain presses rubber covered bottom rolls. Both bottom and top rolls are of exceptionally heavy design, 40 inches in diameter.



At the right, several of the large steel elbows for stock lines which were rubber lined by the Huntington Rubber Mills of Seattle.

Felt drying rolls are located just ahead of each of the two plain presses and the returning press section felt passes over them. There are two Beloit suction felt rolls.

New type horizontal split casing vacuum pumps, built by the Bingham Pump Company furnish the necessary vacuum for the suction couch, the suction press, the suction felt rolls, and, jointly with the barometric legs, supply the vacuum for the Broughton system on the suction flat boxes. One of these pumps shows clearly in the drive picture.

The press section rolls and the fourdrinier rolls are all mounted on anti-friction bearings. Press frames and press housings are of extra heavy constuction to withstand the necessary pressures. The operating mechanism lifting the top press rolls and for applying the pressure is encased in the housing, permitting the free passing of the pulp sheet.

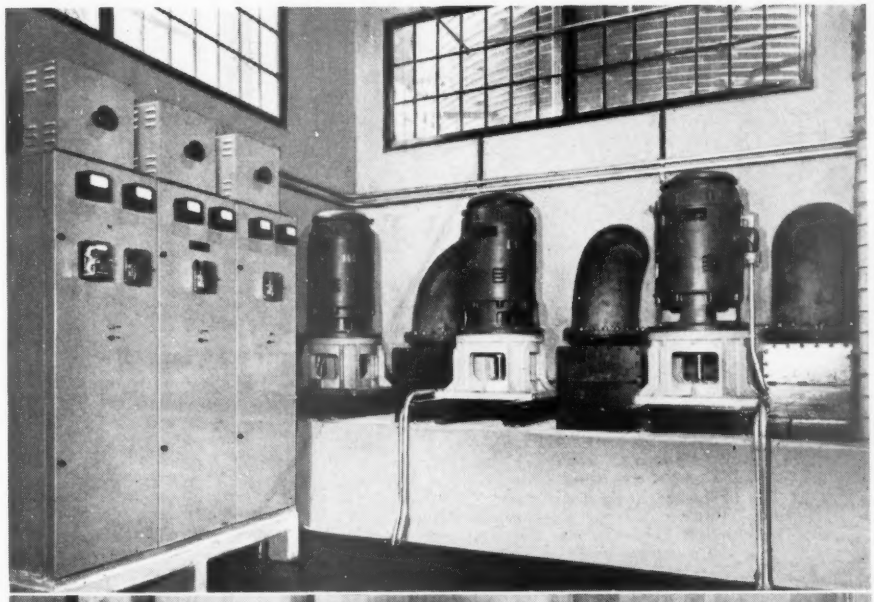
The Minton Dryer

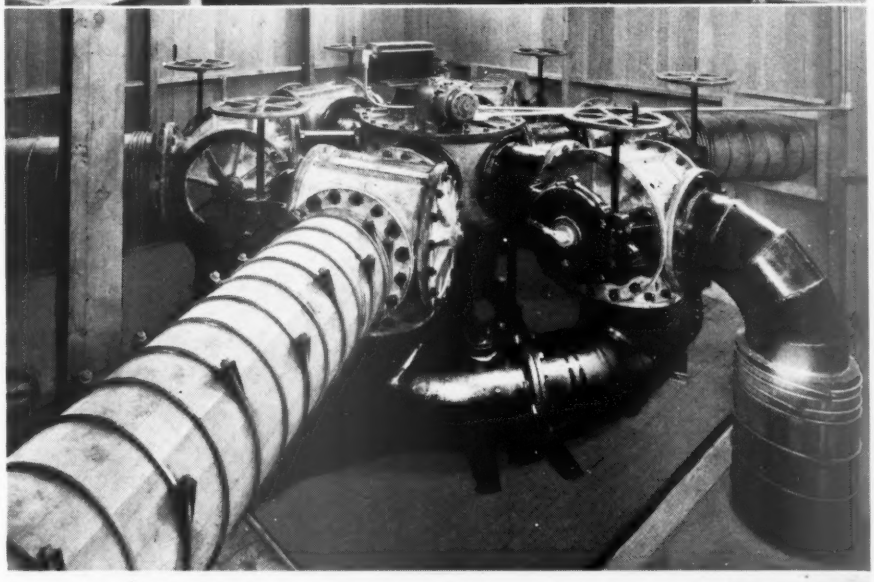
From the second plain press the pulp sheet passes through chromium plated seal rolls into the vacuum dryer which is 144 feet long and 14 feet wide. These seal rolls, both at the intake and the discharge ends of the dryer, were chromium plated to insure a perfect seal and to prevent the picking up of lint from the pulp sheet. The plating was done by the Chromium Corporation of America. The seal rolls are all mounted on SKF bearings for perfect, permanent alignment.

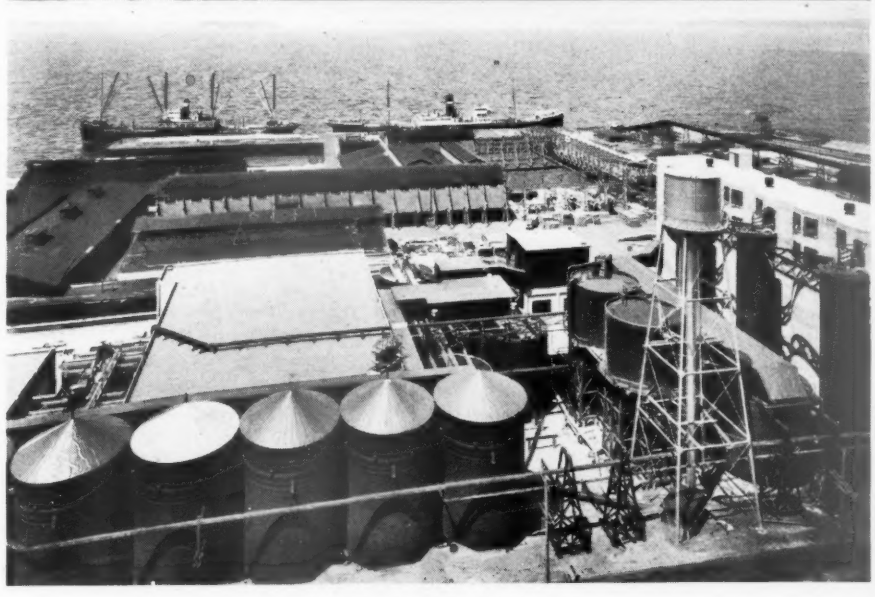
The Minton Vacuum Dryer in the Everett mill has 44 drying cylinders, divided into three sections. The dryer rolls are mounted on anti-friction bearings whose mountings have been improved by placing the housings on the outside of the machine. The shafting passes through the machine casing by means of a stuffing box. This method keeps the bearings cooler and gives them greater accessibility. A gravity feed oiling system keeps the oil reservoir in each bearing filled with cool, flowing Texaco Ursa oil, heavy. The vacuum dryer is designed to carry as high as 28 inches of vacuum.

A Fulton dryer drainage system removes condensate from the drying cylinders.

Fast's Flexible Couplings are used between all of the Western Gear Works herringbone speed reducers and the driven parts of the fourdrinier, press section and the vacuum dryer. The purpose of the Fast's couplings, which are also on the drying machine at Longview, is to prevent transmission of vibration to the machine from the drive and to absorb without strain any misalignment, thus making for smoother production, longer life of parts, decreased maintenance and the elimination of coupling breakdown. There are 24 Fast's Flexible Couplings in the Everett mill.







At the top, three of the vertical stock pumps operating in a sump in the screen room. In the center is the six way stock valve located above the stock tanks. Perfect blending of stock is accomplished through this valve which can be set for automatic discharge through time cams.

The view at the right shows the wood stock tanks, blow pits and gas condensing towers. The roof of the screen room shows at the left center, the sulphur conveyor at the upper right and the docks in the background.

Controlling the Vacuum Dryer

The stock in the machine headbox runs approximately .7 per cent consistency. The sheet entering the Minton Vacuum Dryer runs approximately 50 per cent air dry.

The pulp testing laboratory at the finishing end of the dryer is complete with instruments for testing moisture, caliper and basis weight. A forced draft drying oven provides quick moisture testing. Here is also equipment for checking the consistencies in the machine head box.

The 1000 KW Westinghouse turbine-generator is located in the machine room but it is under the supervision of the power plant operator. Provision has been made for by-passing steam around the turbine if the safe maximum turbine load becomes lower than the steam consumption of the drying cylinders.

The complement of instruments on the Minton dryer is unusually complete. In addition to the usual flow and pressure and desuperheating equipment, each end of the machine is under automatic temperature control. Of a special interest is the Foxboro Verigraph Moisture Control system, which is arranged to re-set the control point in the temperature controller on the dry end of the machine. Moisture content of the sheet is measured just after it leaves the spring-roll and the recording system in the Verigraph gives a chart record of actual moisture content of the finished sheet.

In the machine room we find the wire pit, couch pit and broke beater pump sump lined with white glazed tile to prevent slime and dirt from accumulating in the system. This installation is similar to the other installations which the Stebbins Engineering and Mfg. Company has made in increasing numbers for other pulp and paper mills throughout the United States and Canada; another means of assuring a finished product of the highest quality.

The Sectional Electric Drive

The General Electric automatic selsyn type sectional drive equipment for driving the 156-inch Rice, Barton & Fales Minton vacuum dryer pulp machine, with a speed range from 75 feet per minute to a maximum of 300 feet per minute, consists of the following:

1 4-unit motor generator set consisting of:
1 300-h.p., 1200 r.p.m., 2200-volt, 3 phase 60-cycle synchronous motor, direct connected to:
1 150-k.w., 250-volt main or "running" D.C. generator;
1 60-k.w., 250-volt "starting" D.C. generator;
1 20-k.w., 250-volt exciter.
All on common bedplate.

1 Master selsyn set.

1 Main automatic control switchboard for controlling main motor generator set with compensated selsyn speed regulators for all section motors. Including enclosed carbon pile resistors. Complete with D.C. generator and exciter voltage regulating equipment.

Section Driving Units

Each section driving unit consists of the following equipment:

1 or 2 (see description) totally enclosed externally ventilated, moderate speed, compound wound, direct current motor.

1 Western Gear Works herringbone type speed reducer of suitable ratio for each motor with Fast flexible coupling on low speed shaft.
Note: The section motor and speed reducer are connected by Western Gear Works flexible couplings, and assembled on a cast iron base.

1 Cone pulley assembly with transmitter and "draw" selsyn for each section except cutter.

Motor Nameplate Rating for Each Section is as follows:

Couch Section—75 h.p.
1st Suction Press
Bottom Roll—30 h.p.
Top Roll—15 h.p. gear motor and chain drive.
2nd Standard Press
Bottom Roll—30 h.p.
Top Roll—15 h.p. gear motor and chain drive.
3rd Standard Press
Bottom Roll—30 h.p.
Top Roll—15 h.p. gear motor and chain drive.
Ingoing Seal
Bottom Roll—15 h.p.
Top Roll—15 h.p.
1st Section Dryers (22 Rolls)—30 h.p.
2nd Section Dryers (22 Rolls)—30 h.p.
Outgoing Seal
Bottom Roll—20 h.p.
Top Roll—20 h.p.
Cutter Section
Beloit single knife duplex slitter type cutter—30 h.p. with PIV Link-Belt drive.

Note: no regulator for cutter section. Motor designed with "drooping" speed characteristics to automatically provide proper sheet tension.

Ventilation

Ventilating air for all section motors is supplied by a 5-h.p. motor driven Sirroco fan.

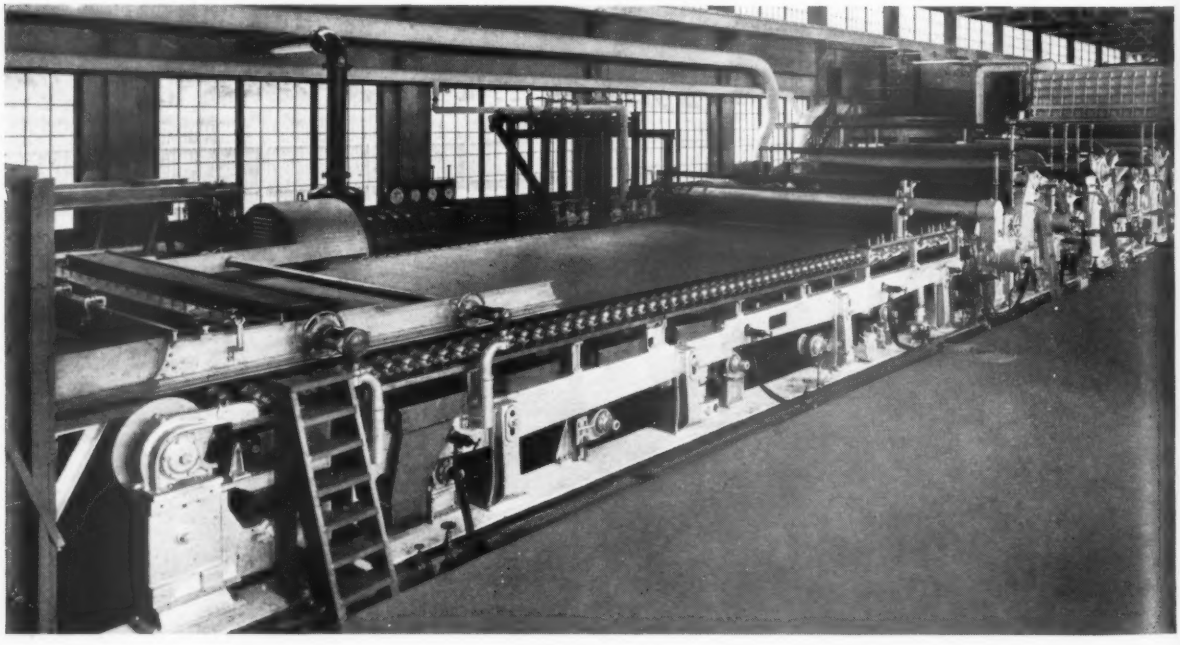
Note: Fan motor control is interlocked with control of main power generator set causing fan motor to always start up with main motor generator set and is equipped with suitable alarm if blower motor should stop or fail to start.

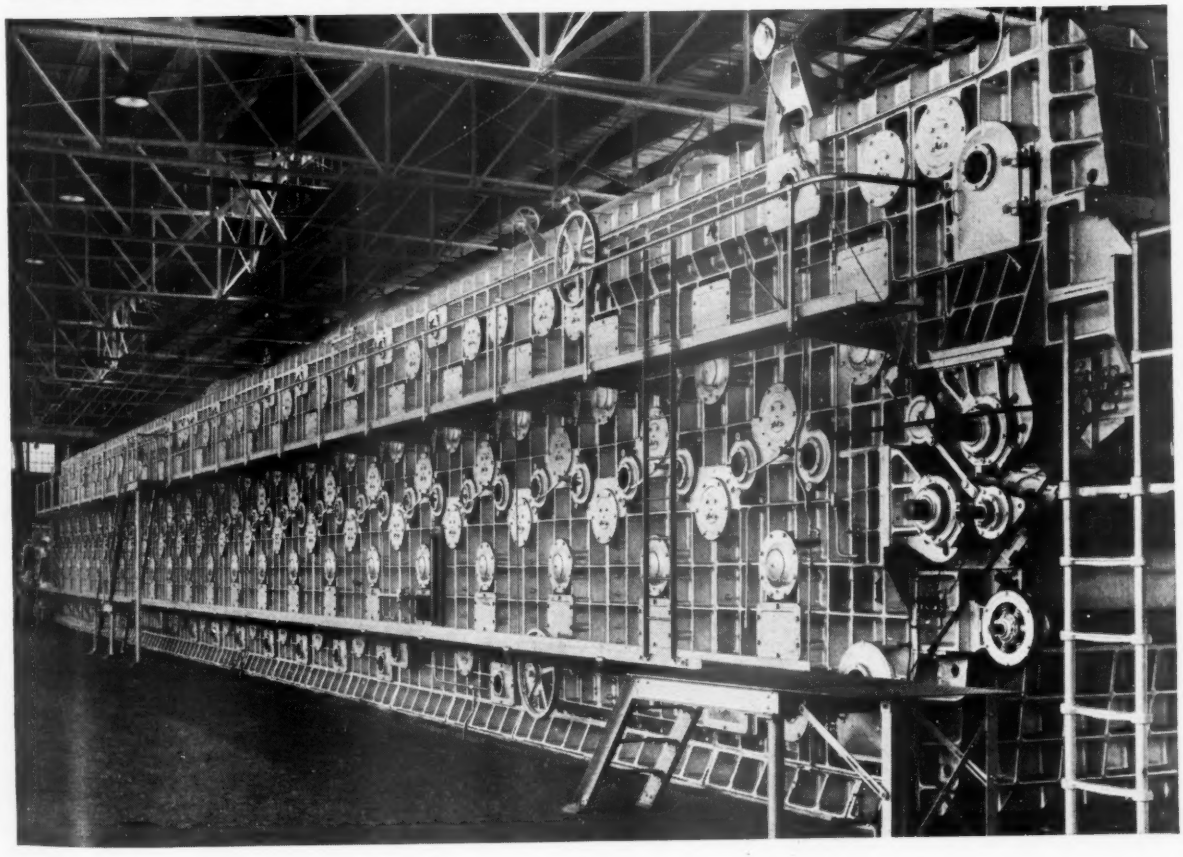
Auxiliary Controls

In addition to main control switchboard mounted on the balcony there is provided an auxiliary control panel mounted on "front side" machine operating floor. By manipulating the rheostat mechanism on this panel the operator can change the speed of the whole pulp machine as a unit. An emergency "stop" button is provided to permit stopping the whole machine if desired. An indicating electric tachometer operated from small D.C. generator driven from second dryer section speed reducer is mounted on this panel.

On the "front side" machine floor opposite each section is provided a splash-proof push button station equipped with three buttons marked "slow," "run," "stop." The station also contains an ammeter to indicate the load on the section.

At the top, right, the press section of the pulp drying machine. At the bottom, the Minton vacuum dryer. Below, the fourdrinier section of the pulp drying machine.





A manually operated selsyn generator mounted near the push button station provides accurate control of "draw" on each section from the "front side" of the machine. "Draw" adjustment can also be made at regulator near section motor if desired on "back side" of machine.

The dryer sections and outgoing seal section are provided with additional push button control permitting reversing operation (only while operator holds "jog" button down) when desired to permit quick removal of "broke." Suitable interlocks are provided to prevent unintentional use of "reverse."

In general, the G-E selsyn sectional drive equipment provides complete automatic "start," "run," "stop" push button control equipment, including suitable overload protection with interlocking features to provide safety in operation.

The complete G-E selsyn sectional drive equipment is essentially similar to that furnished on the Minton dryer for the Pulp Division Weyerhaeuser Timber at Longview, Wash. (which has been in operation several years) with detail improvements and modifications to fit the changes in specifications of the pulp drying machine.

Air Conditioning

The painstaking care exercised in producing clean pulp and keeping it clean up to the machine chest is not allowed to go for naught when the stock goes on the wire. Precautions are taken in the machine room to keep dirt from entering the pulp.

Since the stock is out in the open when passing over the fourdrinier and going through the presses, the machine room has been made dust tight. The side walls are almost entirely windows which have been permanently sealed to keep out dirt. All air entering the machine room is carefully filtered, conditioned, heated to the proper temperature, and evenly distributed by a J. O. Ross Engineering Corporation air conditioning system.

The machine started up using a Lindsay wire, Lockport and Knox wet felts and Asten-Hill asbestos dryer felts.

Cutting and Baling

The handling of the finished pulp sheets is accomplished through the use of a new design cutter box which eliminates the usual back-breaking labor of lifting the sheets out of the box onto the scales. The two photographs of the discharge end of the dryer show clearly how the heavy lifting has been eliminated by the cutter box and conveyor design.

A box running the width of the machine has a sliding bottom of steel rods which hold the 30 inch square sheets as they are cut. A portable section of roller conveyor, pivoted at one end, is swung under the cutter box and raised by an electric motor gear drive to the height of the cutter box. The steel rods are withdrawn allowing the pulp sheets to rest on the conveyor rolls.

As the sheets pile up the conveyor section is continually lowered by the electric motor. When the pile has reached the desired height, the steel rods are again pushed out to serve as the bottom of the cutter box, and the conveyor section filled with pulp sheets is swung to the side, lining up with the fixed conveyor which carries the pulp over the scales and through the hydraulic press and the automatic wire tying machine. The pivoted conveyor section on the other side of the machine is then swung into place under the cutter box, the steel rods withdrawn and the process repeated for the other line of weighing, pressing and tying.

Two Parker-Leaver automatic wire tying machines, one on each conveyor line, speedily complete the baling of the pulp sheets after they have been pressed to a pre-determined density in the Baldwin-Southwark hydraulic presses. The two Parker-Leaver automatic wire tying machines installed in the Longview pulp mill when it was completed in 1931 solved satisfactorily the long studied problem of tying pulp bales.

From the tying machines the finished pulp bales are taken by an enclosed belt conveyor up and over the railroad siding and down into the pulp warehouse where the warehouse man gives the bales a second weighing at the end of the conveyor.

The warehouse is a new building containing ample capacity to accommodate the pulp awaiting shipment by rail and by water. At one end of the warehouse is the railroad loading dock and at the other salt water dock where ocean freighters are loaded. Two Baker electric trucks and one Baker gas-electric truck handle the baled pulp in the warehouse, load it into the box cars and take it onto the dock where it is picked up by ship slings.

THE POWER PLANT

The production of steam and electric power has been synchronized to the demands of the various departments of the pulp mill. In laying out the design of the power plant the relative timing of peak demands for steam and electric power were taken into consideration and a balanced, efficient system was worked out for meeting them.

Briefly, the new power plant consists of two 4 drum Sterling type Babcock & Wilcox boilers designed to operate at a pressure of 600 pounds per square inch, producing steam at 150 degrees Fahrenheit, superheat. As the primary fuel is hogged wood waste, Dutch ovens are provided for efficiently burning it.

A precautionary measure is the installation of four oil burners per boiler to permit the use of fuel oil in case of failure of the hogged fuel supply.

Thermal efficiency is increased by the use of water cooled grates and water cooled walls. Air to the boilers passes through forced draft fans, then through tubular air preheaters where it is heated to approximately 550 degrees Fahrenheit. Induced draft fans draw the stack gases through a cinder catcher before exhausting to the concrete stack.

About two-thirds of the feed water comes from the filter plant and the remaining third is made up of condensate from the drying machine. A Cochrane de-aerating heater removes dissolved oxygen and CO_2 from the feed water and also preheats it. A closed high pressure heater brings the preheating up to 370 degrees F. Feed water is pumped by either one of two Worthington six stage centrifugal pumps placed between the deaerating and the closed heater, one being driven electrically and the other by a steam turbine. The boiler feed is controlled by Copes feed water regulators.

Feed water is tested daily by one of the laboratory chemists for chloride, phosphate, sulphate and alkalinity concentrations accumulating in each boiler. The results of these routine tests determines the chemical treatment introduced into the feed water to prevent scale formation and to inhibit caustic embrittlement. A Builders Iron Foundry integrating flow meter measures the amount of feed water and once each hour automatically starts a positive displacement pump which feeds the necessary treatment into the boiler water.

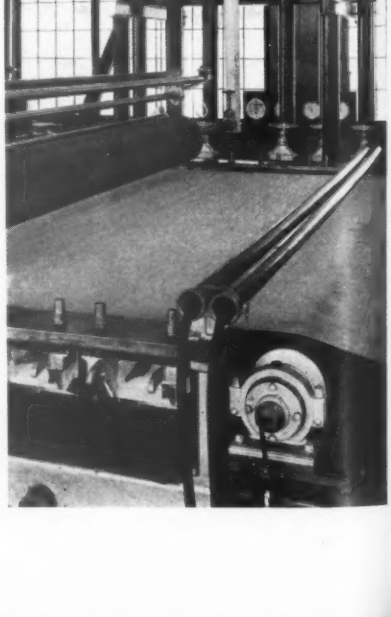
The capacity of the boiler plant is about 2,500,000 pounds of water evaporated every 24 hours.

Steam Control

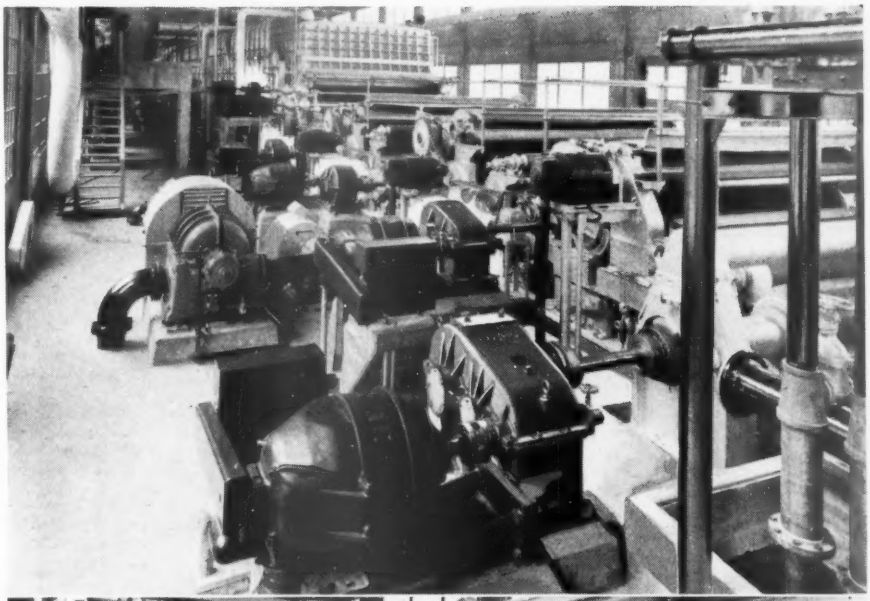
In keeping with the rest of the mill, power plant operators are informed as to operating conditions by indicating and recording instruments. Feed water passes through a Worthington displacement type water meter before going to the grates and deaerator. Each boiler is equipped with a Cochrane electric type steam flow meter. Brown draft gauges, Hayes CO_2 indicators, Taylor indicating thermometers and Foxboro pressure gauges, all contributing to efficient operation of the steam generating units.

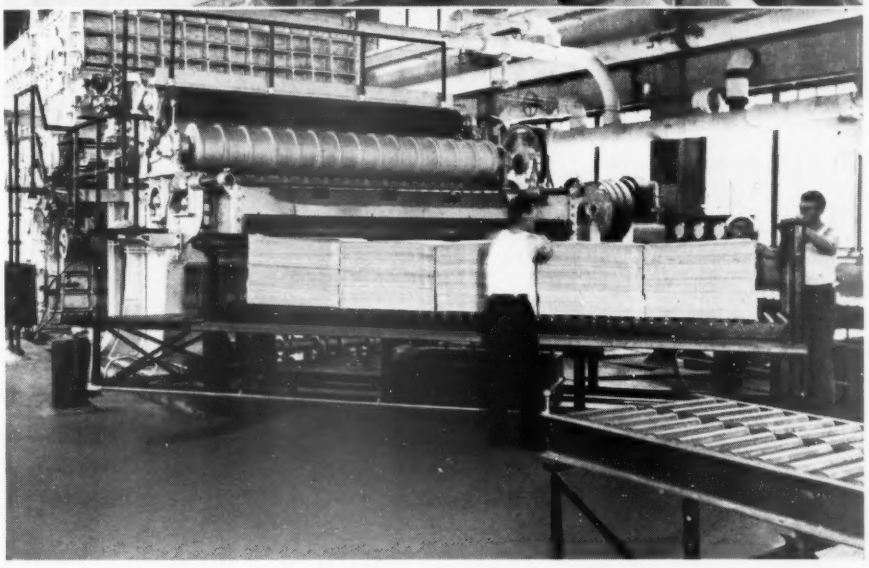
The use of Mercon steam regulators in the new pulp mill includes a new and interesting development. Mercon regulators are in general use for control of pressures and temperatures of the steam supply to the digesters, Minton vacuum dryer, sawmill, chipping plant, acid heaters and similar applications.

The photograph of the three Mercon regulators in the machine room (the regulators are in the circles) shows the arrangement employed by Mr. Schoenwerk for controlling the supply of steam to the dryers. The turbine exhaust at 30 pounds constitutes the main source of supply with a 6 inch Mercon combination reducing valve and desuperheater unit (A in the photograph) substituting in case of turbine shutdown, and also serving as makeup. The exhaust pressure is subsequently reduced to the desired dryer pressure, a 12 inch Mercon constant reduced pressure regulator serving the wet end dryers (B in the photogaph). A 5 inch similar unit serves the dry end section of the dryers (C in the photograph).



A closeup of the Broughton suction flat box vacuum system.





At the right, the sectional electric drive on the pulp drying machine. Below, the finishing end showing the new sheet discharge and handling system.

Provision is made for adjustment of the dryer pressure within a range of 5 to 30 degrees. This adjustment may be either manual or automatically responsive to temperature or sheet moisture content through the Foxboro Verigraph or the temperature control.

A recent development of the Mercon Regulator Company is the Mercon combination reducing valve and desuperheater unit, which has been employed in control of the steam supply to the digesters and to the sawmill. This unit embodies both pressure reduction and desuperheating in a single package, automatically proportioning desuperheating water supply to steam demand, providing uniform steam quality and greatly reducing space and cost. The Mercon Regulator Company is represented in the Pacific Northwest by R. E. Chase & Company of Tacoma.

Electric Power

Electric power for the Weyerhaeuser pulp mill is produced by two Westinghouse turbine generators. The first turbine generator is located in the power plant. It is a 3125 KVA, 80 per cent power factor, 2500 KW back pressure turbo generator unit, and is equipped with a direct connected exciter and an air cooler. The generator is wound for 3 phase 60 cycle 2400 volts. This turbine is designed for a total steam inlet pressure of 570 pounds at throttle with approximately 200 degrees of superheat, and exhausts at from 180 to 225 pounds pressure into the exhaust lines, about 130 degrees superheat. The turbine is equipped with back pressure regulator and such other accessories as are standard with a unit of this type. The entire output of the two boilers is employed to operate this larger turbine.

The second turbine generator unit is located in the machine room. It is a 1250 KVA, 80 per cent power factor, 1000 KW turbine generator unit of the back pressure type. The generator for this unit is separately excited, the main generator itself being wound for 3 phase 60 cycle, 2400 volts and direct connected to the main outside bus serving the various pulp mill units. This turbine is designed for a normal inlet pressure at throttle of 170 pounds gauge and to exhaust at from 20 to 35 pounds gauge back pressure into the exhaust line connecting to the dryer header of the pulp drying machine.

Both turbines exhaust directly into the process steam lines, there being no provision for condenser exhaust. The steam passing through the turbines supplies the process steam demands. Steam admission into the turbines is controlled by back pressure regulators. There is, therefore, no direct control of the generator load, it being solely dependent upon process steam requirements.

In both the main power house and in the machine room there is installed standard Westinghouse switchboard equipment to meet requirements of the turbine units, and also to provide the usual outgoing feeder panel serving the different plant units.

Most of the motors and controls in the Everett pulp mill were furnished by the Westinghouse Electric & Manufacturing Company. The controls were assembled in the Westinghouse service shop in Seattle. All controls are of the cubicle type for both the 550 volt and 2200 volt circuits.

In each of the plant units, machine room, screen room, knotter building, digester and acid plants, chipping plant and boiler house there are located a group of 2200 volt cubicle motor controls serving all of the motors wound for three phase 60 cycle 2200 volt as located in these plant units. Likewise, located in each of these plant units are the necessary 550 volt motor control cubicles for motors of that voltage.

All of the control units are equipped throughout with De-ion circuit breakers and across-the-line contactors. There are no fuses on any of the motor control circuits located in this new mill.

The lighting panels serving the various lighting circuits located in each of the plant buildings, and also including the main office, the panelboards are built to include the De-ion flipon breakers eliminating fuses on all of the lighting circuits.

This is the first plant of this type in the Northwest where the De-ion circuit breaker has been used exclusively for motor controls also all lighting, eliminating entirely the old fusible link which has been standard in the past.

As to the lighting, the companys new office is equipped throughout with Westinghouse Magnalux units of the latest type, and in the machine room special lighting fixtures are installed with high intensity mercury lamps over the wet end of the machine—all providing adequate illumination for these buildings.

As an auxiliary source of electric power supply the mill has a 11 K.V. connection with the Puget Sound Power & Light Company's Broadway substation in Everett. Weyerhaeuser own and operate a 1000 K.V.A., 11K.V. to 2300 volt substation located near the southeast corner of the power plant. The 11 K.V. disconnecting switch and oil circuit breaker and the 11 K.V. metering equipment is the property of the Puget Sound Power & Light Company. There is a short underground 3 phase, 2300 volt connection between the substation and the power

plant bus through a disconnecting switch and oil circuit breaker located on the Weyerhaeuser switchboard.

The inter-connecting 11 K.V. line consists of 2 miles of 3 phase 4 wire No. 2 copper, operated at a nominal potential of 7200 volts (12,500 volts line to line). There is a 11 K.V. disconnecting switch and oil circuit breaker at the Puget Sound Power & Light Company's Broadway substation connecting the line with the substation 11 K.V. bus.

Hogged Fuel Handling and Storage

Since hogged wood waste is the basic fuel for producing steam and electric power for the new Weyerhaeuser Everett pulp mill, the efficient handling of the large quantities needed constitutes a most important part of the mill mechanism.

Hogged fuel for the boilers comes from two sources, the sawmill and wood preparation plant and from Weyerhaeuser sawmills B and C on the Snohomish River. Wood preparation at the pulp mill does not produce enough fuel to supply all the steam required. The necessary additional hogged fuel is brought by barges from the Weyehaeuser sawmills to the pulp mill dock. These barges serve a double purpose, to convey the fuel and as auxiliary storage capacity. Two barges may be moored at the dock at one time.

Wood refuse from the wood preparing plant is conveyed by belt to a hog which reduces the material to usable fuel. From this point the fuel is conveyed by belt conveyors to the fuel storage conveyor of the double strand rivetless chain type which distributes it into the fuel bin. This bin originally served the old Mill A sawmill which was on the site of the present pulp mill. The bin is not a large one and acts merely as an equalizer, storing fuel from the wood preparation plant together with the excess fuel unloader from the barges but not burned immediately in the boilers. Fuel is drawn from this storage bin by a double strand cast link type chain conveyor which discharges onto a 30 inch belt conveyor carrying fuel to the boiler house.

The fuel coming to the plant in barges is unloaded onto the dock by a Colby hammer head type crane fitted with a 5 cubic yard bucket. From the bucket the fuel is dropped into a hopper mounted on the crane structure. The hopper is fitted with a chain type feeder which feeds the fuel at a uniform rate onto a 24 inch wide belt conveyor located under the crane and running parallel with the face of the unloading dock. The crane can, as it travels along the dock, unload fuel from the barges for a distance of about 200 feet without the necessity of moving the barges during the unloading.

From the crane the 24 inch belt conveyor, completely housed in, and in three sections, conveys the fuel to a point near the corner of the fuel storage house. From here a 30 inch belt conveyor takes the fuel to the boiler house either directly from the barges or from the fuel storage building as required. This belt conveyor delivers the hogged fuel to a double strand flight conveyor employing rivetless chain, carrying the fuel to the boilers. The fuel not burned in the boilers is carried back on the lower run of this flight conveyor from which it is discharged to another belt conveyor, which in turn, carries the unused fuel back to the distributing conveyor over the fuel bin, mixing the fuel from the barges with the fuel from the wood preparing plants. From the storage bin the fuel is removed for burning as previously described.

By means of this arrangement fuel is always available for the boilers, either from the storage bin or from the barges as desired, regardless of whether the wood preparation is operating.

The average capacity of this hogged fuel handling system is 30 units or 6,000 cubic feet of fuel per hour.

A very valuable feature of the conveying system is the electrical inter-locking of all conveyors so they can be started and stopped in sequence thereby preventing overloading.

All hogged fuel from the barges and from the bin is automatically weighed by Merrick Weightometers before being burned. With the exception of a few parts which were utilized from conveyors in the old sawmill system, all conveyor parts such as motors, herringbone gear reducers, roller chain drives, and transmission machinery, anti-friction bearing conveyor idlers, rubber conveyor belting and rivetless chain, were furnished by the Link-Belt Company.

BUILDING DESIGN and CONSTRUCTION

Among the most interesting features of the new Weyerhaeuser Pulp Division unbleached sulphite mill at Everett is the design and construction of the buildings.

The aim was to provide buildings of ample capacity for their particular purpose, built of the most suitable materials and at the lowest cost commensurate with long life.

The wood preparation building and the chip storage building are entirely of wood. The design embodies new ideas which contribute to a better, longer lasting mill type construction. Trusses for these buildings were fabricated on the ground and raised by derrick into position. In the wood preparing plant the chippers rest on separate concrete foundations, thereby avoiding any vibration in the building itself.

The power house, the acid plant and the sulphur storage building are of concrete as are the acid towers which were constructed by the economical, efficient slip-form method.

The slip-form concrete construction system was also applied to the digester building and to the accumulator buildings. The design of the digester building, which, it will be noted from the photograph, slightly resembles grain elevator design, permitted the reduction in thickness of the walls without sacrificing structural strength. Another factor allowing savings in the construction of the digester buildings was the elimination of chip storage over the digesters with its accompanying weight. The roof of this building is of concrete.

The riffler and flat screen building is of concrete with a wooden roof. Construction was by the conventional form method.

The erection of the pulp drying machine building by the slip-form method of concrete construction is said to be the first application of this method to a rectangular building.

The pulp storage building is of wood, heavy mill type construction.

The long sulphur conveyor and the chip conveyor from storage to the digesters are of wood. The chip conveyor employs metal connectors, and through the application of new ideas great strength has been obtained, sufficient to withstand the heavy winds and to carry the chips, while at the same time supporting the main 14 inch steam line to the digesters and the machine room.

WOOD TANKS and PIPE

Wood tanks and wood pipe contribute to the clean pulp produced by the Weyerhaeuser unbleached sulphite pulp mill at Everett.

Wood tanks are used for acid, for blow pits, stock tanks and for white water tanks. Wood pipe conveys water and stock.

Pipe elbows are of steel, rubber covered to prevent rust getting into the pulp. Valves are either rubber covered or of bronze. The rubber lining of elbows and valves was done by the Huntington Rubber Mills of Seattle, who also covered all agitator shafts.

The wood filter plant, the wood tanks and the wood pipe were all fabricated from Weyerhaeuser Douglas fir by the National Tank & Pipe Company of Portland, Oregon, who also did all the erections and installation work.

No-K-D

The wood preservative, No-D-K, manufactured by the Tennessee Eastman Corporation of Kingsport, Tennessee, was employed to protect the wood filter plant. the wood tanks, the wood roofs, the wood pipe and the piling caps from decay and insects.

No-D-K is a natural wood creosote of a pleasing dark brown color. It is easily applied in highly concentrated form by either brush or spray. No-D-K penetrates deeply into the wood to which it is applied. It is insoluble in water and will not blister, peel or drip.

The use of this preservative provides double protection to the wood to which it has been applied, protection against fungi and insects, thereby insuring the long life of the wooden equipment at the Weyerhaeuser mill.

Pacific Coast distributors of No-D-K are the Paraffine Companies, Inc., with offices in San Francisco, Los Angeles, Portland and Seattle.

IN APPRECIATION

PACIFIC PULP & PAPER INDUSTRY desires to express its sincere appreciation for the fine cooperation so freely given in the preparation of this article by Mr. J. P. Weyerhaeuser, Jr. and Mr. Minot Davis of the Weyerhaeuser Timber Company; by Mr. Robert B. Wolf, Mr. G. S. Brazeau and the other members of the Pulp Division; by Mr. Otto C. Schoenwerk, the consulting engineer who designed and built the new Weyerhaeuser pulp mill; and by the many others whose helpful contributions made possible this detailed description of the Weyerhaeuser unbleached sulphite pulp mill at Everett, Washington.

TECHNICAL DEPARTMENT

The operation of the new Weyerhaeuser unbleached sulphite pulp mill at Everett, Washington, is under technical direction throughout. From the wood through to the finished pulp bales, quantitative and qualitative measurements are made at each point of the control for the information of the operators.

Mr. Robert B. Wolf, manager of the Pulp Division, believes that a uniformly high grade product can only be produced when all variables in the manufacturing processes are under the conscious control of the operators. Uniformity of the bleached sulphite pulp produced by the Weyerhaeuser Longview mill demonstrates the soundness of this idea.

In line with this principle, the Everett pulp mill has been equipped with recording and controlling instruments embodying the latest refinements and developments. But instruments alone will not accomplish the desired results in producing a pulp of uniformly high quality. The plant must be intelligently operated by men who understand the meaning of results indicated by the instruments.

The Technical Department, under the direction of Mr. Gerald F. Alcorn, Technical Director, is so integrated into the process that the operators of the various departments are constantly aware of all variations which affect the quality and uniformity of the product. With complete information before them, these men are able to adjust the processing to maintain the pre-determined standards.

The technical director and his staff of laboratory assistants coordinate the technical work in the several departments. The daily reports from the operating departments are plotted each day on specially designed graphical charts. These charts are so arranged that in one section they show the daily postings for each month of the current year; another section records the monthly averages for the current year compared with the peceding year, and finallv there is a section where the records are accumulated in yearly periods. Data on these charts is so arranged that each department has its own individual charts.

The detailed information on these charts provides the management with an immediate picture of current operations as well as a quick reference to past performances.

These charts are kept in a special room known as the chart room which adjoins the laboratory. They are readily accessible to any one. Operators are encouraged to visit this chart room and to study the records. Thus, they learn the relationships between their own department and the plant as a whole.

In addition to the above mentioned charts, graphical records are posted in each department of the mill which give the day-to-day results of the current month; the monthly averages of the current year as well as those of the preceding year. By this means the operators are stimulated to take an intelligent interest in their work.

Where a variable cannot be controlled by instruments, it is constantly watched by the technical department. It will be noted that the major function of this department is to keep the operators in charge fully informed as to the effects of their actions upon the materials they are processing.

At the top, the method of conveying, pressing and tying the pulp bales. Below, a part of the well equipped control laboratory.

A system of grading certain important variables over which the operator has control is maintained. Standards are developed for each variable and the per cent nearness to that standard is computed daily. These daily records are also accumulated on a monthly average basis in order to evaluate the relative progress of the operators in each group. As a result, each operator is constantly informed as to how carefully he has maintained his control over the quality factors involved in his individual operation. Such records of progress, together with the graphical charts, make the operator feel that he has a real and vital part to perform in the maintenance of the high quality standards that the Pulp Division has set for itself.

Daily conferences of the operating department heads are held to discuss the data compiled by the technical department for the previous day. This discussion is creative, because it revolves around accurately compiled factual data.

Located in the office building on the ground floor, the technical control laboratory is fully equipped with instruments for making all physical and chemical tests of pulp and of the materials used in the processes. A constant temperature and humidity room is provided in which pulp testing is done at a temperature of seventy degrees Fahrenheit and a relative humidity of sixty-five per cent. This equipment was manufactured by the J. O. Ross Engineering Corporation.

The technical control department is closely allied with the sales department. The Pulp Division's sales representatives are intimately acquainted with the mill's technical control method and are, therefore, equipped with information which is of material assistance in supplying customers with pulp best suited to their requirements.

PRODUCTION CONTROL

Through Automatic Weighing of Raw Materials

The seven Merrick Weightometers, as installed in the new Weyerhaeuser Timber Company's pulp mill situated at Everett, Washington, serve to make its product probably the most closely checked of any mill of its kind in North America, if not in the entire world. Sulphur, chips and hogged fuel are weighed and re-weighed, in and out of storage, which results much check to a degree of accuracy with in 1 per cent or closer. This weighing is accomplished continuously, as the materials move along the various belt conveyors, to storage or into direct use. Variations in belt load and conveyor speed are instantly caught and recorded by each Weightometer and the weights thus obtained totalized in short tons of 2000 pounds. Each Weightometer has been equipped with electrical contacts suitable for the installation of distant recording instruments at any future time that the management may desire to install such equipment.

Weighing Sulphur

Probably the greatest innovation in the use of Weightometers is offered here by their application to the weighing of sulphur. This is an entirely new departure for West Coast pulp mills as the usual practice to date, has been confined to the slow and expensive method of hand weighing with all its inaccuracies. With the introduction of Merrick Weightometers for the service at this point, these wasteful factors have been entirely eliminated as the Weightometer cannot make a mistake and the totalized weights are constantly available.

To weigh all sulphur received at the mill, a Weightometer has been installed near the foot of the inclined 18-inch belt conveyor which carries this product from the unloading dock to the sulphur storage bins. A second Weightometer is located on the 18-inch belt conveyor transporting the sulphur from the storage bins to the melting vat. In this way, a complete check on both the sulphur received and consumed, is obtained.

Weighing Chips

All clean chips, the wood for which originates in the log breakdown plant, are weighed as they pass to storage on the 30-inch chip conveyor, after having passed through the screens. Thus the exact amount of chips going to storage is at all times known. A second Weightometer, mounted on the 42-inch belt conveyor, weighs all chips going from storage to any one of the several digesters. By this layout, both the amount of chips received and used, are carefully checked.

Weighing Hogged Fuel

The same care and accuracy is used in weighing the hogged fuel although here the problem is somewhat more complicated, due to the several points of origin. All fuel shipments, received by scow, are weighed over a Weightometer installed upon the 24-inch belt conveyor transporting the hogged fuel from the unloading dock to the boiler house and, when necessary, on to fuel storage. A second Weightometer is installed on the 24-inch belt conveyor which carries all hogged fuel, originating in the sawmill, to fuel storage. A third Weightometer is situated on the 24-inch belt conveyor which carries the oversize material from the chip screens, back to the sawmill, for grinding into hogged fuel. The weights thus obtained from this source, not only give the management at all times the actual percentage of rejects in the chips, but further allow the pulp mill to receive credit for the amount of refuse returned to the sawmill. With the above hogged fuel weighing arrangement, an accurate record of hogged fuel, received from all sources, must necessarily result.

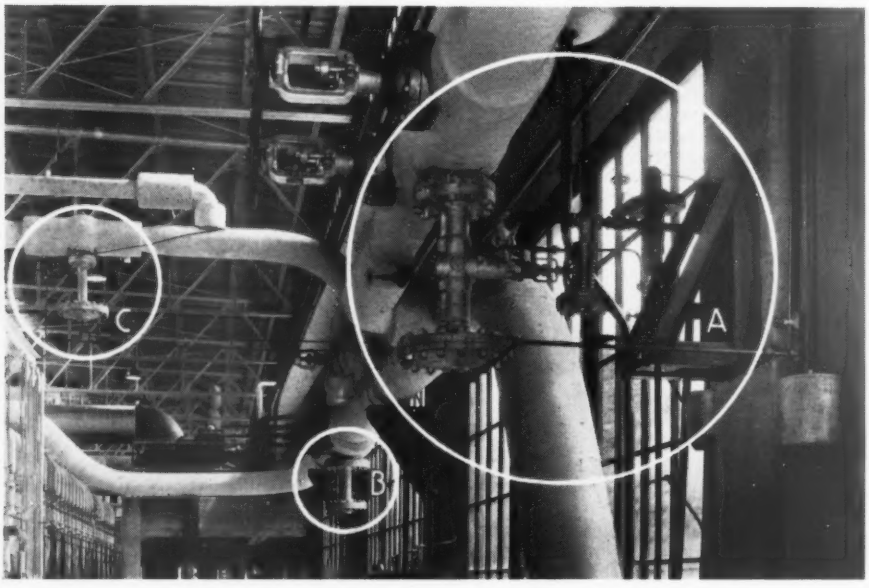
The Everett installations bring the total of Merrick Weightometers in operation in Weyerhaeuser pulp mills to ten, three having been previously installed in in the bleached sulphite pulp mill at Longview. It was due principally to the excellent results obtained from these machines at Longview that prompted the Weyerhaeuser officials to decide upon an even more comprehensive installation at Everett. The trend today is very distinctly toward closer control of all products entering into the manufacture of pulp and paper, and in this the Merrick Weightometer is playing no small part.

The Weightometer

The Merrick Weightometer itself is ingeniously designed to perform the function of continually weighing moving loads by mechanically multiplying together two variable quantities and totalizing the successive products. These variable quantities consist of, first, the ever varying load on the conveyor, which is subject to extreme and to very rapid fluctuations, and second, the slightly varying speed of the conveyor belt. The speed of any conveyor, while usually considered as constant, in reality varies slightly with the load, and, in weighing, unless this condition is taken into consideration, any final results obtained, will be erroneous. The Merrick Weightometer meets this condition perfectly and for this reason, the manufacturers, the Merrick Scale Manufacturing Company, of Passaic, New Jersey, are consistently able to guarantee an accuracy of 99 per cent or closer, on any approved installation.

As each Weightometer is carefully designed and built for the exact service intended, and for the conveyor upon which it must operate, there can be no standard, as the conveyor width and length, conveyor speed, angle of inclination and the minimum, peak and average loads, vary with each installation. However, the Merrick Weightometer is applicable to all conditions and services and can be designed for use, not only upon belts, but upon bucket and pan conveyors as well, thus making it generally suitable to any size, type, inclination, capacity and speed compatible with good conveyor practice. Further, it is successfully used in the weighing of cable cars or tramway buckets, while running over a track, thus obtaining the weight of the material therein without stopping the moving load. The resulting weights in every case, may be totalized in short tons, long tons, metric tons, barrels, or any other unit required by the customer.

There are a number of special auxiliary instruments, manufactured by the company, which are available to satisfy the more exacting needs of some industries. Should it be required that the totalized readings of the Weightometer be available in the laboratory, instrument room, superintendent's office, or at some other point remote from the scale, a Merrick "Rateogaph," either with a circular or strip type chart, will give a permanent record of the tonnage carried over the Weightometer during any hour or day. These instruments are operated electrically, by means of contacts with the master counter of the Weightometer. Further, should it be desired to weigh material in batches, this may easily be accomplished by the installation of a Merrick "Pre-Determining Counter." With such an instrument, it is possible to set same at the exact amount desired



At the left, three of the Mercon steam regulators in the machine room. Descriptions of A, B and C are given in the article.

to be weighed. When such amount of material has passed over the Weightometer, the instrument will sound a bell or siren, light a lamp, or if desired, stop the conveyor.

The Merrick Weightometer was invented, in principle, nearly thirty years ago by Herbert L. Merrick. It has, of course, in the ensuing years, undergone constant refinement until today it is practically "fool proof." Mr. Merrick still heads his own company and continues to give his individual attention to each and every installation. Thousands of these machines have been sold, and are in operation in every country in the world, weighing materials of very conceivable kind. These include a large number of pulp and paper mill installations, here in the Pacific Northwest and elsewhere.

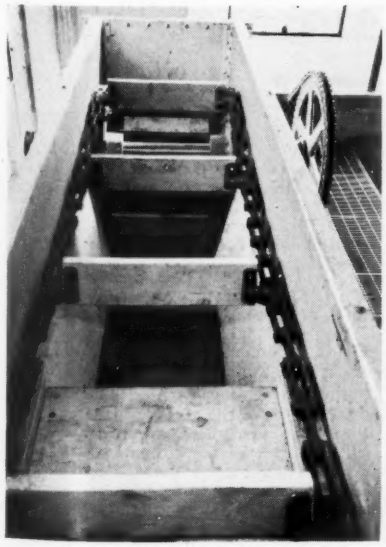
The Merrick Scale Manufacturing Company of Passaic, N. J., is represented in the Pacific Northwest by Irving R. Gard & Company of Seattle.

At the top, the hammerhead crane on the dock unloading hogged fuel from barges and discharging into the belt conveyor shown underneath the crane. This conveyor runs to the boilers and also to the fuel storage building. Below it is the 1000-kw. turbine generator located in the machine room, through which the steam is exhausted for electric power generation before being used for drying.

At the bottom, right, is an interior view of the boiler house showing the fronts of the boilers.

In the center, at the bottom of the page, is one of the several Hi-Press desuperheater pumping units installed in the new mill.

Directly below is a section of the double strand flight conveyor, using rivetless chain, in the boiler house, delivering hogged fuel to the chutes (shown in the boiler house photo) which carry it by gravity into the Dutch ovens. Note how the unused fuel is carried around the end of the conveyor. On the lower run of this flight conveyor the unused hogged fuel is taken to the storage building.

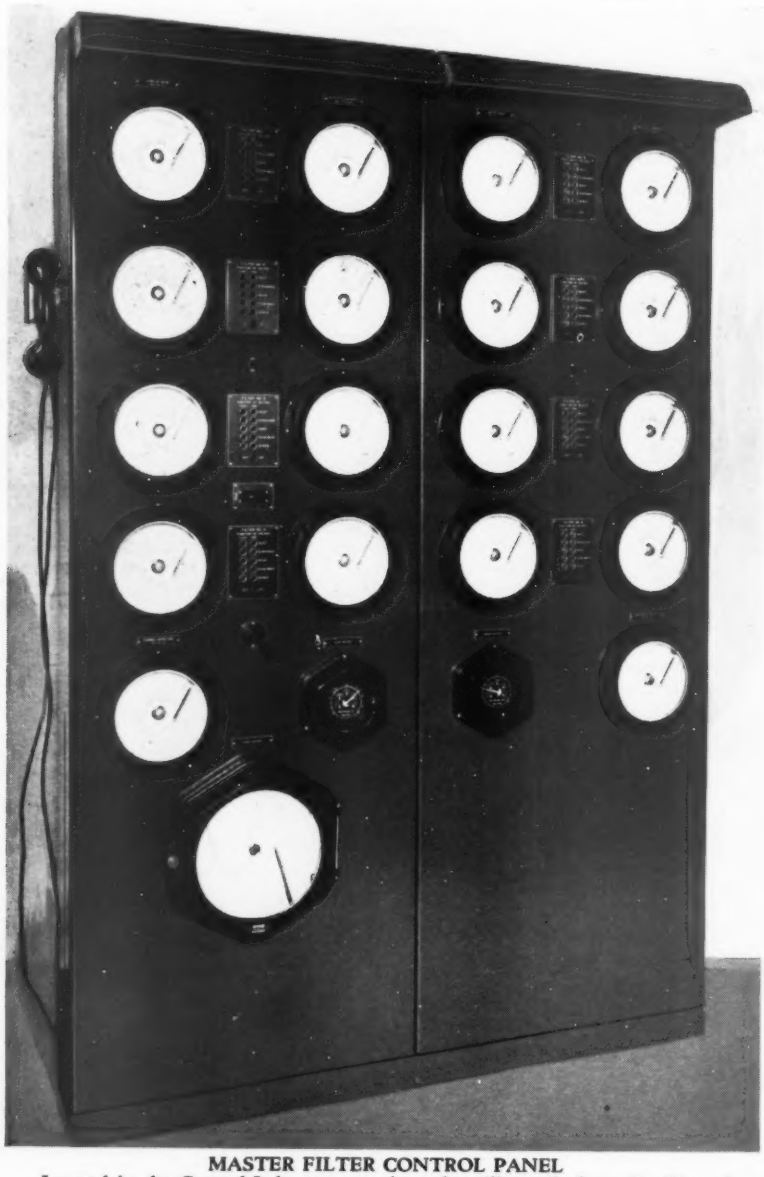


THE FILTER PLANT
PURE WATER FOR CLEAN PULP

The Weyerhaeuser water filter plant is located on a hill 250 feet above and about a mile southeast of the pulp mill. The hill top had to be cleared of thick underbrush and rather large second-growth timber before the four acres required for the filter plant could be leveled and made ready for construction.

The water supply for the new pulp mill is one of exceptional quality. In common with the water supplies for many of the pulp mills in Western Washington, its source is on the western slope of the Cascade Range. All of the waters drawn from this terrain are low in total dissolved solids, soft, and generally free from suspended inorganic turbidities. At certain periods of the year considerable color and suspended organic matter is present.

For the manufacture of high-grade sulphite pulp, filtration of the waters from these sources is necessary. Color, which will range from ten parts per million in the winter up to about one hundred parts per million in the late summer and early fall with turbidities that rarely exceed one hundred parts are easily susceptible to complete removal at low treatment costs. The water delivered to the new mill at Everett is clear, colorless, and with a pH adjusted to about 7.2. The water supply is derived from the Sultan Basin through the supply works of the City of Everett's Water Department and is delivered to the plant through a 24-inch line under a head of about 100 feet. The filtration plant is located in the park property belonging to the City of Everett and the filtered water is delivered through a line approximately 6,000 feet long to the mill under a head of about 250 feet.



MASTER FILTER CONTROL PANEL

Located in the Control Laboratory at the pulp mill a mile from the filter plant. The recording instruments are for recording the rate of flow and the loss of head in the filter units.

There are also recorders to indicate the water depth in the clear well, the wash water tank, and to record the raw water flow into the filter plant.

Signal lamps on small panels indicate filter and other important valve positions in the filter plant.

Sixteen Million Gallons Per Day Capacity

The present installed capacity of the filter plant is 16 million gallons per day with the main facilities ranged for an ultimate expansion to about 26 million gallons per day when mill demands warrant. In the main the arrangement of the plant follows more or less the standard design of the best type for complete water purification. After treatment with alum (and lime when necessary) chlorine and ammonia, the water is delivered through the mixing chambers into the settling basins, thence into the filters, thence into the clearwell from which point it flows by gravity to the mill.

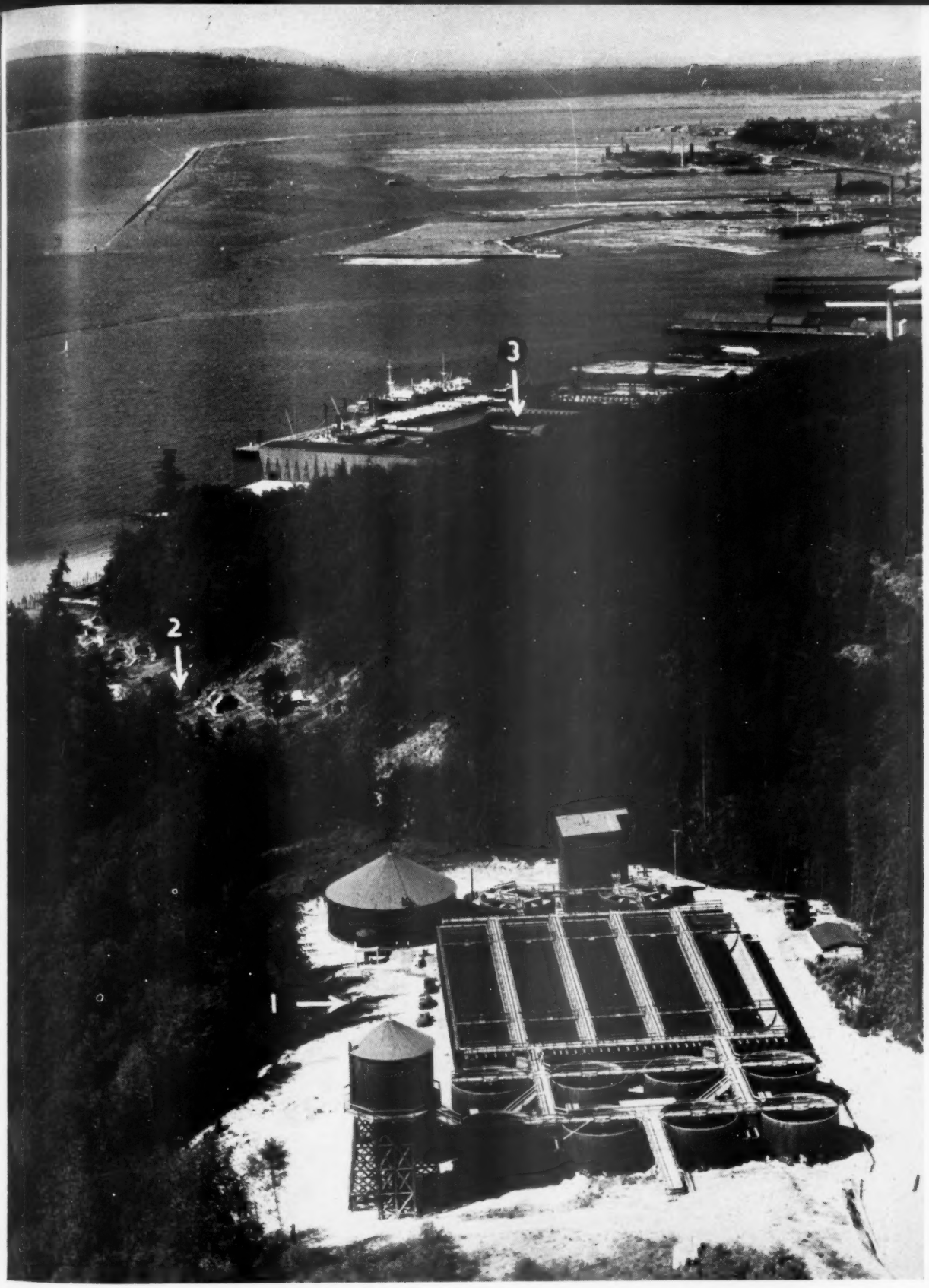
Constructed Entirely of Wood

There are several points of interest in connection with the plant that may be noted. First—the plant is constructed entirely of wood and is probably the largest all wood plant ever built. The settling basins which are large semi-circular, horizontal wood flumes, are 26 feet in diameter with a water depth of 14 feet and approximately 200 feet long. The design of these large flumes is quite ingenious and economical. They have proven entirely satisfactory, both from the functional and operating standpoint. The filters, 32 feet in diameter by 13 feet, are eight in number, each with a rated capacity of 2 million gallons per day. The water entering the settling basins and discharged from those basins and distributed to the filters, is through rectangular wooden flumes about 8 feet wide with a water depth of 5 feet. Due to the fact that the organic turbidities are somewhat difficult to settle due to the lightness of the floc, all of the gate and valve openings serving the filters and settling basins are large enough to provide sufficiently low velocities to prevent break-up of the floc in transit through the plant. All pipe lines in and about the plant are all wood with fittings of welded steel pipe, carefully protected with rust resistant material.

The filtered water may be treated with lime to adjust its pH to the desired operating conditions in the mill. At present only one clearwell tank of wood 70 feet in diameter by 22 feet deep with a capacity of 700,000 gallons is provided. Space is left for a future clearwell tank of the same size. The plant covers a ground area of between three and four acres.

Filter Control Equipment

In general the filter control equipment follows standard practice and is of the most modern type of design including filter rate controllers, loss of head and rate of flow gauges on each unit. Because of the location of the plant and in order to safeguard against any possible overflow that might cause damage, particular attention has been paid to the matter of relieving the water through ample overflows. Overflow provision at each important element of the plant and the main drain down the hill has a capacity of approximately 200 feet deep into a natural water course, the beauty of which cannot be marred, either by erosion or unsightly structures.



THE RELATIONSHIP OF THE WATER FILTER PLANT TO THE PULP MILL

No. 1, the water filtration and treating plant on the high bluff overlooking Puget Sound 250 feet above the pulp mill and a mile away. No. 2, shows the route of the water pipeline from the filter plant down the ravine to the shore. No. 3, the new Weyerhaeuser unbleached sulphite pulp mill lies hidden just below the bluff. The tops of the buildings and the docks show in the photograph.

At the upper right is the waterfront of the city of Everett, Washington.

"Velocity Killer" a Feature

There is located at the lower end of this drain line a "velocity killer" designed to absorb within a space of about 14 feet approximately 300 horsepower of energy with 10,000 gallons per minute flowing through the waste line. In practice this device functions quite satisfactory, the waste being delivered into the creek bed at a velocity of less than 3 feet per second.

Remote Control

Owing to its remoteness from the mill (about 6,000 feet by pipe line and 5½ miles by auto road) it is essential that supervisory control of the plant operation be constantly available to the mill operators. This is accomplished by means of remote control equipment, which continuously indicates the records, on two large panels in the pulp mill office, all of the main functions of the plant.

The rate of flow and the loss of head on each filter is shown, likewise the position of all filter valves. The depth of water in the settling basins, the filters, the wash water tank and the clearwell are also graphically recorded as well as the amount of water being pumped to the wash tank and the rate and amount of raw water entering the plant. These functions are carried over telephone cable from a panel in the head house to the large panels located in the laboratory of the mill office building. This supervisory control system continuously and accurately gives a picture to the mill superintendent of the exact amount of water passing through the plant and available to the mill. Telephone connection to the mill laboratory office over the supervisory cable system is available at several points throughout the plant.

By means of this system of control, the entire operation of this large plant is handled with only one operator per shift.

Incoming Water Energy Used

At the inlet of the plant, the energy of this incoming raw water is utilized to operate a turbine driving the wash water pump which automatically maintains the wash tank full. The discharge from this turbine is into the mixing chambers. The control of water level in the settling basins is by means of automatic devices located on the incoming raw water line in the head house.

Particular attention has been paid to the conditioning of the water prior to settling. Diffusion of chemicals in their proper order of application is obtained through two mixing flumes in the head house from which the 'dosed" raw water flows by gravity to the inlet of each of two mixing chambers of the dual flow type. The design of these mixing chambers is the result of considerable preliminary work and water studies to provide the maximum effect in floc information in the shortest possible time. Due to the fact that the mixing chambers are circular in type, the mixing compartments are radial segments of a circle, the areas of each adjusted and balanced to provide uniform mixing rates from inlet to outlet.

No Power Required

No power is required for operation of the plant except the small pressure units provided for the hydraulically operated valves on the filters. All the filter valves are controlled through solenoid operated valves opened and closed from a small filter control panel located at the center of each of the eight filter units. Of particular note is the fact that no buildings are necessary over the filter plant structures except at the head house.

The plant has been in operation about six weeks and has consistently delivered sparkling, clear, colorless, sterile water. The general scheme and details of design were prepared in collaboration with and under the direction of Mr. O. C. Schoenwerk, the engineer in charge, by Shibley Company of Seattle, who also installed all filter equipment in the plant.

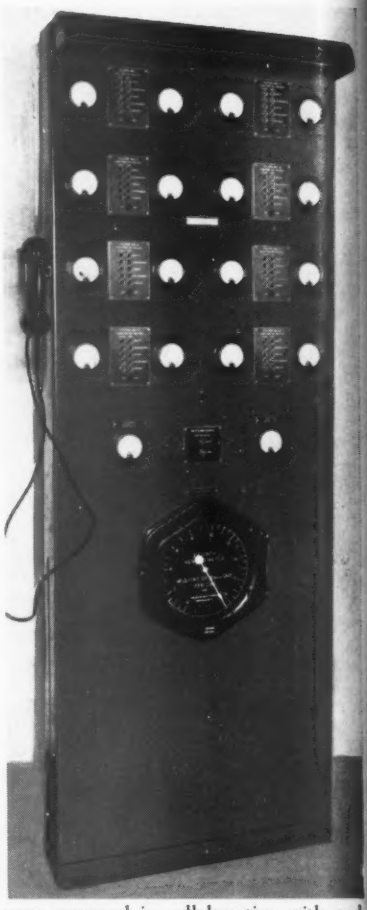
SECONDARY FILTER CONTROL

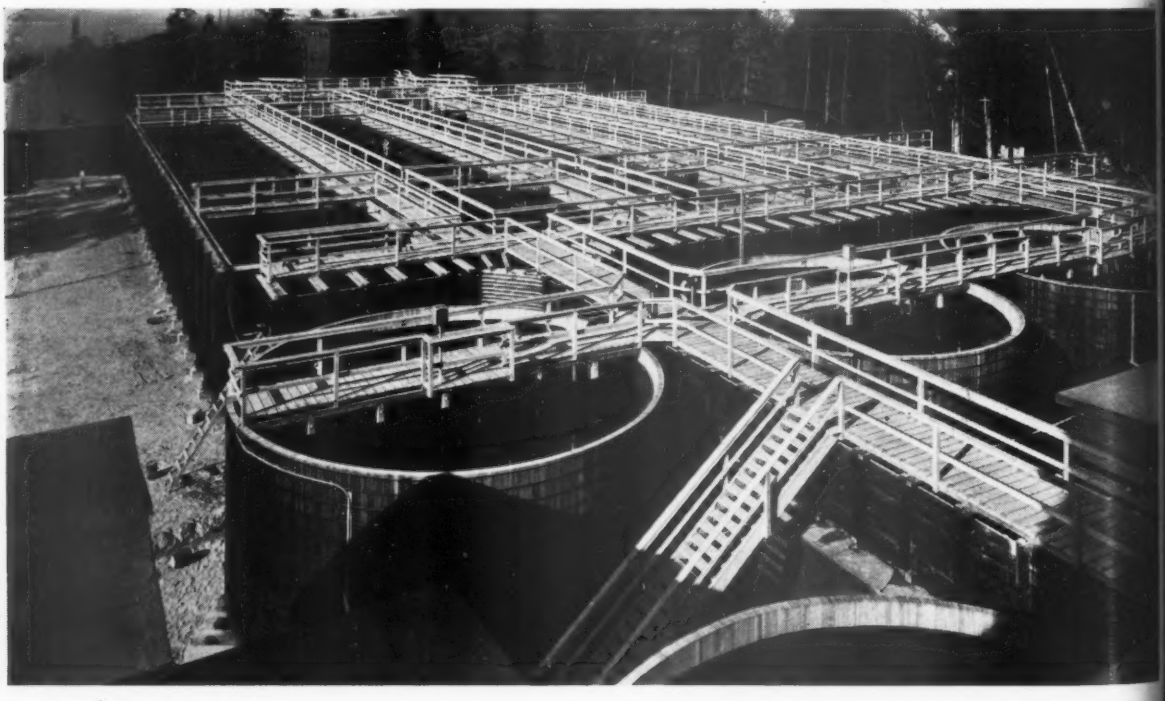
The secondary filter plant master control panel is located in the Head House of the filter plant.

This panel is in circuit between the filter units and the master filter control panel in the pulp mill Control Laboratory.

Indicating dials show loss of head and rate of flow for the filter units, and also the depth of water in the clear well, settling basins and wash water tank.

The large indicator shows rate of flow of the raw water entering the filter plant.





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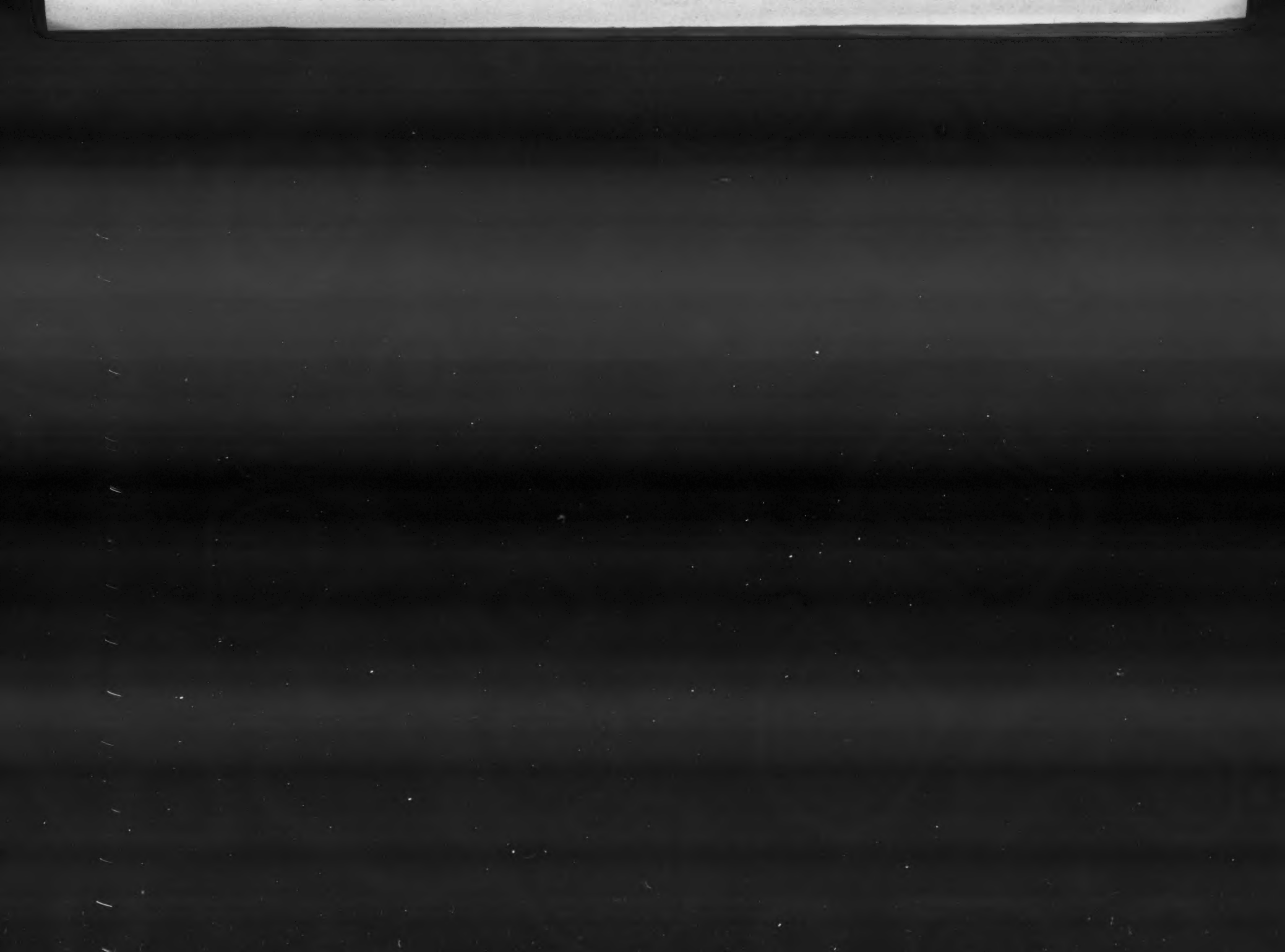


PULPWOOD RESOURCES of WESTERN WASHINGTON and OREGON

Tables Give Cubic Foot Totals of Pulp Species Above 4 Inches Breast Height

WESTERN Washington and Western Oregon does not represent a very great land area, when compared with the areas in other regions from which pulp wood is secured, bur the stand of pulp wood in this Pacific Coast area is of such large volume that opportunity is offered for a permanent and economical supply of raw material for a pulp and paper industry several times larger than the present development.

This region is generally referred to as the Douglas fir region. It covers that area from the summit of the Cascades West to the Pacific Ocean, broadly speaking. This is the most heavily timbered region in the United States and an area in which growth is not only phenomenally rapid, but remarkably heavy per acre. The rate of growth is covered in a separate article in this Review Number.

The Douglas fir region has a total of 542,000,000,000 board feet, log scale. Ot this total, about 60 per cent is Douglas fir. This wood, while forming an important source of pulp wood for existing pulp and paper mills on the Pacific Coast, is not generally referred to as a pulp wood species. Therefore Douglas fir is not included in the tables shown in connection with this article, these tables being based upon data collected by the United States Forest Service in its inventory of timber resources, a study which is now being concluded in the Douglas fir region.

Therefore, in consideration of these figures, it should be remembered that in addition to the regular pulp woods, there is more than the same amount of Douglas fir ,which by the operation of some of the most successful pulp and paper mills upon the Pacific Coast, has proven its right to be considered a pulp wood for certain types of pulp.

It should also be remembered that the conventional pulp woods, especially hemlock and the white firs, are found in large volume throughout the Pacific Coast area. For the balance of the Pacific Coast -region, the data has not been checked and completed as yet by the United States Forest Service in its compilation of the timber resources.

Table I

Table I gives the total cubic footages for the pulping woods, by species, for the Douglas fir region of Western Washington and Western Oregon. The figures are for total volume of timber 4 inches and over diameter, breast height. The dominant position of western hemlock, from a volume standpoint, is well shown by this table. The large volume of the white firs is also well shown. The geographical location of the various counties is shown in an accompanying map, which is a further aid to the study of the location of the pulp resources of the Pacific Coast.

Table II.

In Table II is shown the volume of the pulping species in each county, the counties being arranged by regions or districts, the data being compiled to show the amounts at present available for cutting. Totals of Tables I and II will not agree. They should not. Table I gives the total volume without respect to availability of timber for use. Table II gives the volume available for cutting for pulp wood not reserved from cutting by statute, proclamation or policy.

In considering the totals it will be noted that the timber unavailable for cutting is not large. The fact that a certain volume of timber may not be available for cutting today, does not mean that it is permanently withdrawn from economic use. Policies respecting this are subject to change and are changed rather frequently.

The region, or districts, as shown on the accompanying map do not represent entirely economic territorial segregations. The data within these areas is grouped, for convenience, to show fairly natural areas which are roughly tributary to the present major developments.

To point out that these districts must not be considered fixed economic areas, it is well to remember that within the last year hemlock logs have moved from Grays Harbor and Willapa Harbor to pulp and paper mills on the Columbia River. Pulp wood from Grays Harbor consistently moves from the Grays Harbor region to Puget Sound. Logs from the Oregon Coast are regularly rafted to Grays Harbor, though these logs are not commonly used for pulp manufacture. There is nothing to prevent rafting, or barging, of pulp logs from the Oregon Coast to Grays Harbor.

There is every possibility of a much greater pulp and paper development than the existing development, where the movement of raw material to mill is only a short distance—but it is also possible to move freely raw material from one district to another.

TABLE I

VOLUME IN CUBIC FEET OF PULP WOODS FOR ALL OWNERSHIPS IN WESTERN WASHINGTON AND WESTERN OREGON

Species—	Western Oregon	Western Washington	Totals
Western Hemlock	6,439,886,000	18,654,070,000	25,093,956,000
Sitka Spruce	1,145,377,000	1,625,924,000	2,771,301,000
Engelmann Spruce	46,643,000	9,259,000	55,902,000
White Fir	1,652,378,000	314,023,000	1,966,401,000
Amabilis Fir	763,712,000	6,567,606,000	7,331,318,000
Noble Fir	1,338,837,000	614,175,000	1,953,012,000
Alpine Fir	24,675,000	37,234,000	61,909,000
Mountain Hemlock	931,527,000	372,386,000	1,303,913,000
Totals	12,343,035,000	28,194,677,000	40,537,712,000

Table II.

VOLUME OF PULP WOODS, OTHER THAN DOUGLAS FIR, IN WESTERN WASHINGTON AND WESTERN OREGON AVAILABLE FOR CUTTING

In Thousands of Cubic Feet

WASHINGTON District and County	
North Puget Sound—	
Whatcom County	1,006,741
Skagit County	1,836,559
Snohomish County	2,266,424
San Juan County	11,461
Island County	8,934
District Total	5,130,119
Central Puget Sound—	
King County	2,166,924
Pierce County	1,358,908
Kitsap County	23,295
Mason County	465,119
Clallam County	3,732,187
East Jefferson County	264,776
District Total	8,011,209
South Puget Sound—	
Thurston County	53,818
Lewis County	2,423,835
District Total	2,477,653
Grays Harbor—	
West Jefferson County	3,191,606
Grays Harbor County	2,902,400
Pacific County	1,908,220
District Total	8,002,226
Columbia River, Wash.—	
Wahkiakum County	508,615
Cowlitz County	972,384
Clark County	34,248
Skamania County	1,825,243
District Total	3,340,490
Total Washington	**26,961,697**

OREGON District and County	
Columbia River—	
Clatsop County	1,089,450
Columbia County	48,139
Washington County	84,693
Multnomah County	227,155
Hood River County	424,900
Clackamas County	1,141,042
District Total	3,015,379
Willamette River—	
Yamhill County	22,774
Polk County	220,277
Marion County	528,369
Benton County	58,273
Linn County	1,465,262
East Lane County	1,455,990
District Total	3,750,945
North Oregon Coast—	
Tillamook County	984,874
Lincoln County	666,705
West Lane County	113,641
District Total	1,765,220
Umpqua River—	
East Douglas County	1,243,033
District Total	1,243,033
South Oregon Coast—	
West Douglas County	392,461
Coos County	434,653
Curry County	185,953
District Total	1,013,067
Rogue River—	
Josephine County	110,289
Jackson County	961,702
District Total	1,071,991
Total Oregon	**11,859,635**

FOREST FACTS

National forests contain 37 per cent of the total timber supply of the State of Washington. They also include 39 per cent of the total timber stand of Oregon. However, this national forest timber is the least valuable partly because it is the least accessible. Timber estimates include all timber of merchantable size regardless of accessibility or character of logging chance. Large quantities may never become economically available.

Latest estimates indicate that of a total of 393 billion board feet of timber in Oregon, 173 billion feet are privately owned; 156 billion feet are in national forests; 46 billion are on O. and C. revested grant lands, and 11 billion on Indian lands.

Latest estimates place the total timber supply of Washington at 276 billion board feet, of which private owners hold 132 billion feet, the national forests 101 billion feet, the state, counties and municipalities 30 billion feet, and other public agencies 13 billion feet.

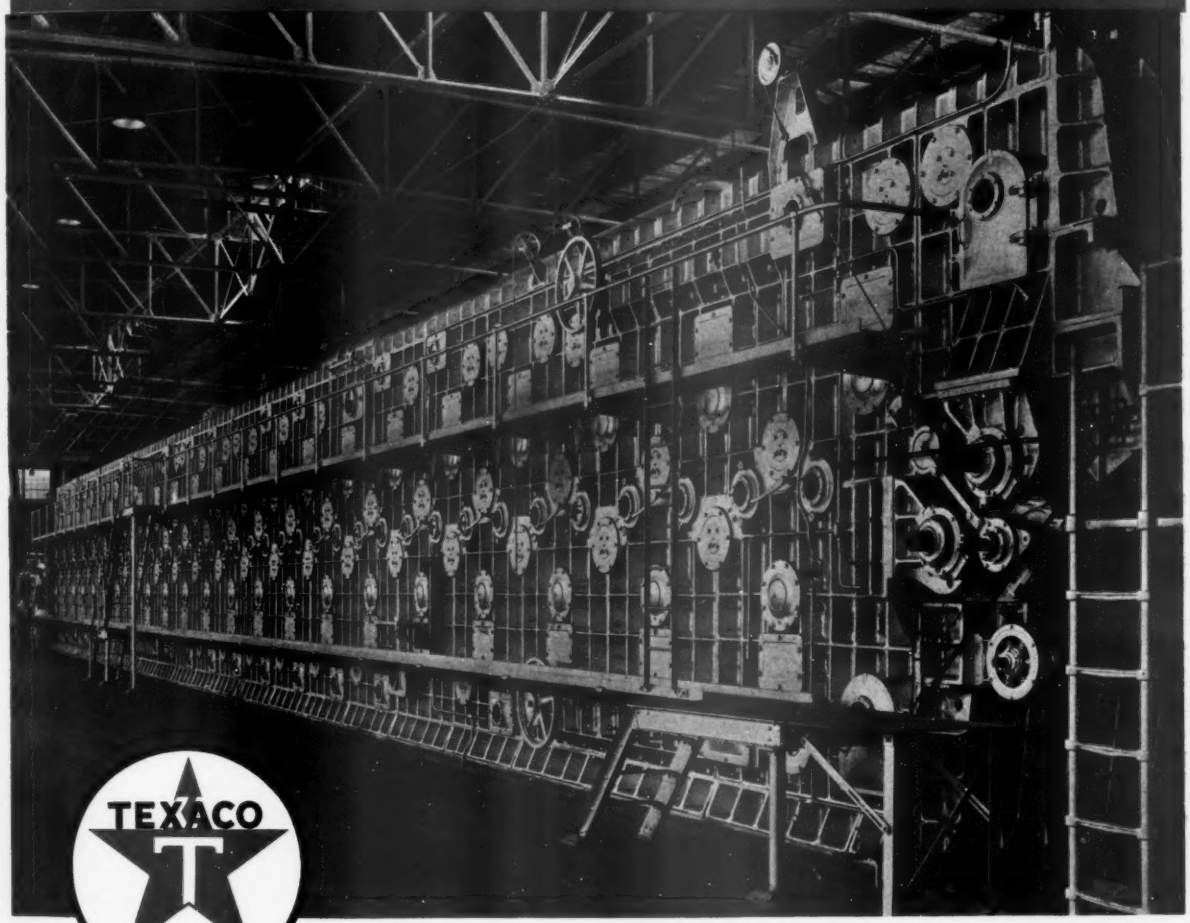
The states of Oregon, Washington, Idaho and Montana contain 55 per cent of the remaining national supply of timber; the timber stand of these four states is equivalent to nearly 90 per cent of the total coniferous timber of Canada.

According to the Washington State Commissioner of public lands, counties of the state in 1934 owned 1,250,000 acres of forest land obtained through delinquent tax foreclosures.

The Pacific Northwest Forest Experiment Station recently found that of the forest land in 18 western Oregon and Washington counties, more than 3,200,000 acres were tax delinquent and almost 479,000 acres had been acquired by the counties for unpaid taxes.

TEXACO LUBRICATION

for Weyerhaeuser's New Everett Plant

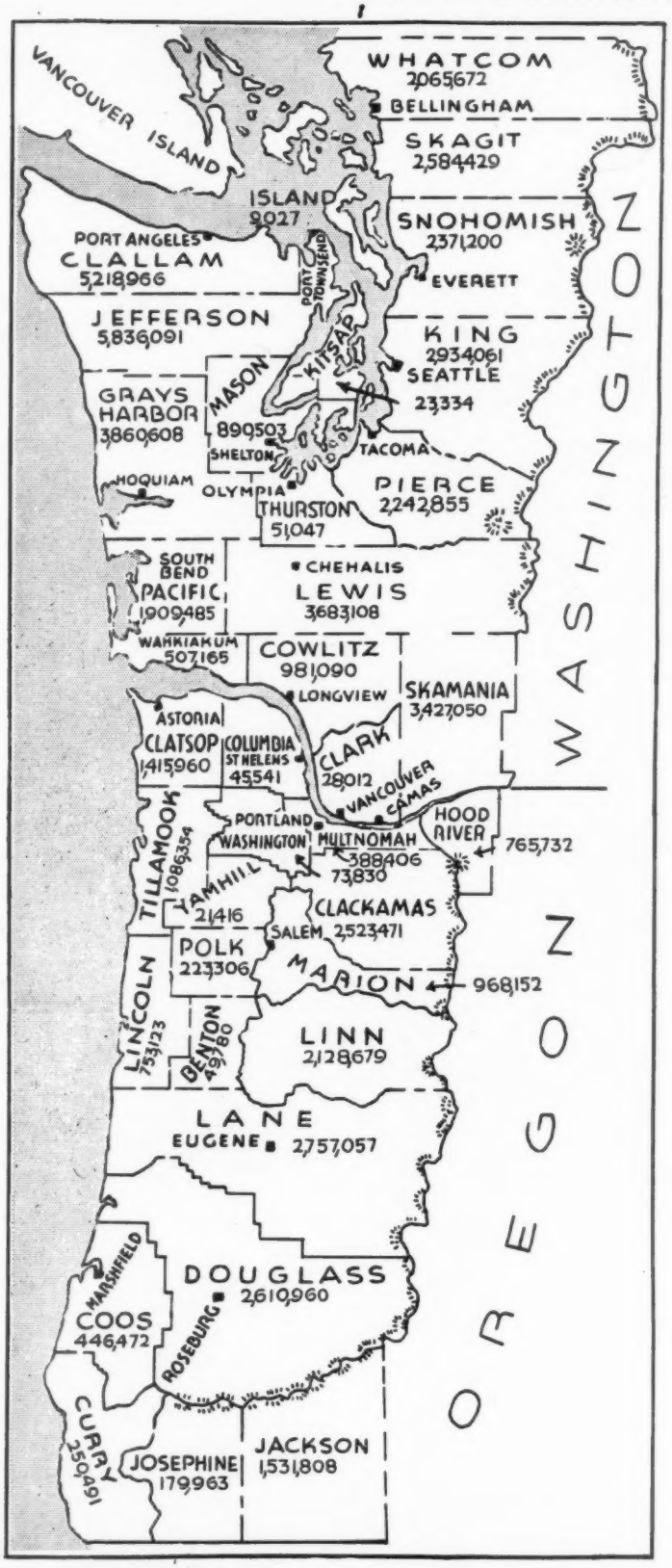


MINTON VACUUM DRYING MACHINE in the new Weyerhaeuser plant at Everett, Washington

A LOT OF THINGS can go wrong in the pulp and paper business but there's one thing you can't afford to put up with, and that's faulty lubrication.... Based on service in their Longview plants, Texaco lubricants have been chosen exclusively to lubricate the Minton Dryer Bearings in the new Weyerhaeuser plant at Everett, Washington. Texaco also lubricates Minton Dryers for the Longview Fiber Company at Longview, and the Olympic Forest Products Company at Port Angeles, Washington. Texaco cuts down operating costs and reduces breakdowns and replacements to the vanishing point. Specify Texaco and be safe.

THE TEXAS COMPANY ★ A CALIFORNIA CORPORATION

TEXACO



The accompanying map of Western Oregon and Western Washington shows the total stand of pulp woods, exclusive of Douglas fir, by counties. The location of these stands with respect to rivers and harbors is clearly indicated.

TAX PRESSURE CAUSES UNSOUND FOREST DEPLETION

Pressure for rapid timber liquidation in Oregon and Washington is vividly brought out by a recent tax survey conducted by Sinclair Wilson, senior economist in the Pacific Northwest forest experiment station, Portland, Oregon, according to the U. S. forest service.

The study shows that the annual property taxes on timber and forest land in Oregon total approximately $1.47 per thousand board feet on the present lumber production in Oregon. The Washington timber and forest land tax approximates 80 cents per thousand board feet on lumber produced in that state. The computation does not include taxes on logs, logging equipment, logging railroads, camp building,s and manufacturing plants. The figures are arrived at by dividing the estimated total annual tax levied on standing timber and forest land in each state by the total lumber, pulpwood, shingles, poles and piling produced for that year.

The extensive uncut timber stands of Oregon compared with a lower annual lumber production than that of Washington accounts for the more unfavorable tax position of Oregon timber, Wilson shows.

The pressure for immediate liquidation of timber holdings in both states is further shown by tax figure compilations for various counties. In Clatsop county, Oregon, Wilson points out that from an average of $2.48 for 58 cases studied the annual tax ranges to as high as $7.27 per acre or 13 cents per thousand board feet on standing timber. In 59 cases in Grays Harbor county, Washington, the tax averages $4.21 per acre on timbered stands and runs to an extreme of $10.81, which is the equivalent of 18 cents per thousand board feet on a stand of 60,000 feet to the acre. In 54 cases in Tillamook county, Oregon, the anuual tax averages 3.7 cents per thousand board feet but ranged to a high of 8 cents.

Foresters point out that heavy carrying charges on standing timber, of which taxes are an important item, are inimical to the conservative management of forests. The desire to escape these carrying charges induces a pressure to liquidate, which is demoralizing to the lumber market and leads to wasteful exploitation. Liquidation of timber supplies without provision for restoring the forest capital inevitably passes a heavier tax burden to other taxable property, which would not be the case if sustained yield timber management were practiced.

Remedies for this situation, according to forest officials, lie in valuing and taxing forest properties in keeping with their deferred income nature, and thrift in expenditures by local government. It is pointed out also that attempts at establishing scattered agricultural developments in forest areas where farming values cannot carry the cost of public service required, such as schools and roads, throw an additional tax burden on forest lands and other property.

They used CRODON plate and stopped worrying

Every one of the 672 pulp screen plates of Weyerhaeuser Timber Company's new Everett mill is CRODON-plated. These plates will produce cleaner and better pulp at lower screening costs than ever before.

Seal rolls of the Minton vacuum drier at the new Weyerhaeuser mill are also CRODON-plated.

Behind every CRODON application are the resources, experience and reputation of America's oldest and largest industrial chromium plating organization. The ability to produce the desired results at minimum expense is the result of wide experience, high technical standards, up-to-date plating equipment and painstaking attention to each customer's individual requirements. The trade-mark CRODON typifies only the best in chromium plate—your guarantee of an economical and dependable solution to problems of combating corrosion and wear.

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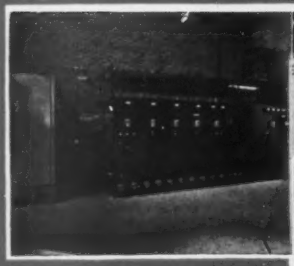
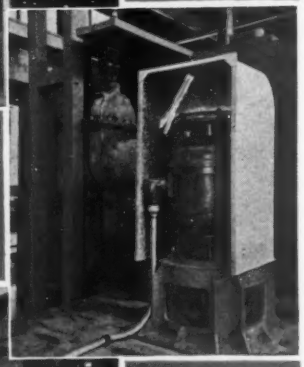
MODERN WESTINGHOUSE

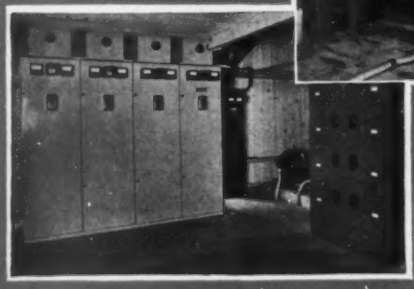
in the New Weyerhaeuser Tu



Left—Three section 2200-volt cubicle serving induced draft fan and boiler feed pump. Center—Main power house switchboard. Right—550-volt motor control cubicle serving fuel conveyors.



Above—Type CS vertical stock chest pump motor in machine room.



Left—2200-volt control units for 72" Sumner chippers. Right—550-volt control for conveyor drive. In the corner a type SK motor—"Industry's Favorite DC Motor."

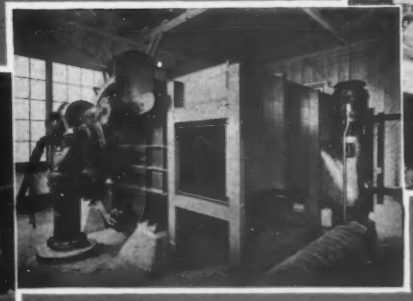
Throughout this modern plant . . . from power house to flat screen, agitator and conveyor drives, modern Westinghouse equipment helps lower production costs.

In the main power house a 2500-kw. back pressure turbine is installed. Another 1000-kw. turbine is located in the machine room.

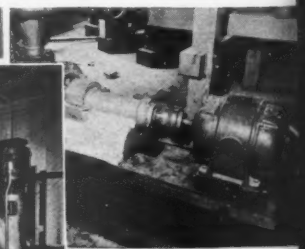
In other parts of the mill Westinghouse equipment efficiently serves chippers, pulp machines, screen drives, fuel conveyors and a host of other machinery.

Perhaps there are drives in your mill that can profitably be modernized. We invite you to bring these drive problems to any one of our strategically located Pacific Coast Offices. Our pulp and paper mill electrical specialists are ready to help you. J 93203

Three 150-hp. 80% P.F. synchronous chipper motors drive 72" Sumner chippers at 514 rpm.



A Bingham pump in the knotter room powered by a 75-hp. vertical type CS pump motor.



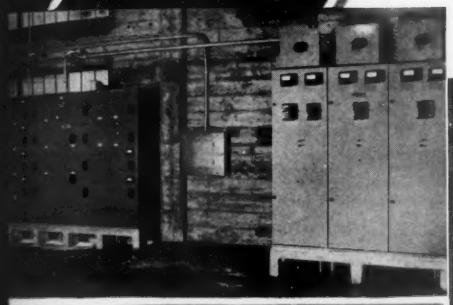
In the acid plant, a type CS drip-proof, splash-proof pump motor.

SI EQUIPMENT

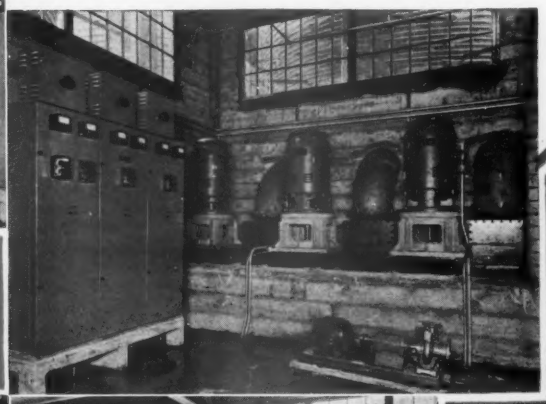
r Pulp Mill

★

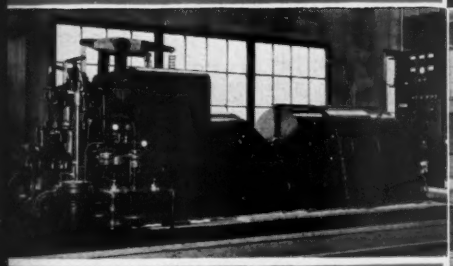
The installations pictured here were photographed in the new Weyerhaeuser Mill at Everett, Washington, which was designed by Mr. O. C. Schoenwerk, Pulp and Paper Mill Engineer. This is the first Pulp and Paper mill on the Pacific Coast in which all motor controls and lighting panels are 100% equipped with "De-ion" Nofuze Circuit Breakers.



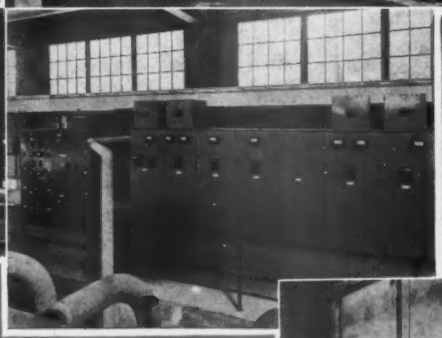
The Screen drives and the vertical synchronous pump motors in the screen room are controlled, respectively, by the 550-volt cubicles (left) and the 2200-volt cubicles at the right.



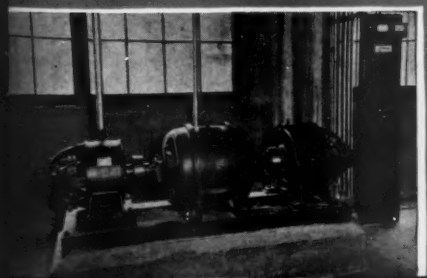
Another screen room installation—three 75-hp., 80% P.F. vertical synchronous pump motors. Cubicle control for these motors is located at the left.



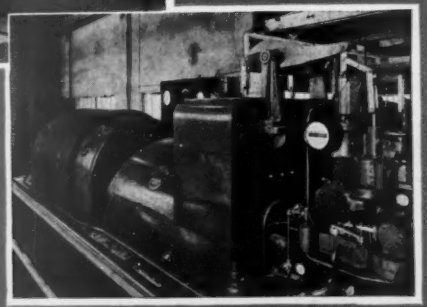
A 1000-kw. back pressure turbine generator. The turbine operates on 165 lbs. pressure at the throttle and exhausts into the pulp machine dryer header at 35 lbs. The switchboard panel for this unit is visible at the right.



Motor control cubicles in machine room controlling both 550-volt and 2200-volt circuits.



Left—Three-unit exciter set with separate generators for exciting a 1000-kw. turbine and synchronous motor.



2500-kw. back pressure turbine in boiler room of main power house. 570 lbs. 725°F at the throttle. 200 lbs. back pressure.

Westinghouse

WESTINGHOUSE 1886 1936 GOLDEN JUBILEE

★

STATISTICAL SECTION

World-Wide Statistical Information of the Pulp and Paper Industry

United States and Canada

PACIFIC COAST WOOD PULP PRODUCTION—1923-1935

Pacific Coast States and British Columbia
(Tons of 2,000 lbs.)

	1923 Tons	1924 Tons	1925 Tons	1926 Tons	1927 Tons	1928 Tons
Washington	136,943	159,539	161,858	199,164	268,349	349,107
Oregon and California	162,653	149,894	160,736	178,841	200,869	213,407
British Columbia	217,076	216,243	230,733	259,504	296,253	310,961
Total Pacific Coast	**516,672**	**525,676**	**553,327**	**637,509**	**775,471**	**873,475**

	1929 Tons	1930 Tons	1931 Tons	1932 Tons	1933 Tons	1934 Tons	1935‡ Tons
Washington	523,948	566,137	580,016	420,529	583,770	709,748	743,223
Oregon and California	256,546	248,952	237,532	187,133	189,332	225,285	283,198
British Columbia	304,619	335,429	310,029	259,586	343,897	383,818	361,800
Total Pacific Coast	**1,085,113**	**1,150,518**	**1,127,577**	**867,248**	**1,117,999**	**1,318,851**	**1,388,221**

Source—U. S. figures up to and including 1933, from U. S. Dept. of Commerce, Bureau of Census; B. C. figures from Dept. of Lands, Forest Branch; and Dominion Bureau of Statistics.

‡ Figures based upon United States Pulp Producers Association total for Oregon and Washington, excepting soda pulp. Addition of soda pulp production and division of products between Oregon and Washington estimated by Pacific Pulp & Paper Industry. No wood pulp production in California.

PACIFIC COAST PULP IMPORTS
1935
(Short Tons)

Customs District	Unbleached Sulphite	Bleached Sulphite	Unbleached Sulphate	Bleached Sulphate	Groundwood Unbleached	Groundwood Bleached	Totals
Los Angeles	8,166	3,451	3,162	110	200	1,536	16,625
San Francisco	5,360	-------	294	------	------	-------	5,654
Washington	1,107	5,988	-------	------	35	-------	7,130
Oregon	-------	-------	7,523	------	------	100	7,623
Totals	**14,633**	**9,439**	**10,979**	**110**	**235**	**1,636**	**37,032**

Source: U. S. Department of Commerce, Bureau of Foreign & Domestic Commerce.

UNITED STATES
WOOD PULP PRODUCTION BY REGIONS[1]—1935

Source—United States Pulp Producers Association
(Tons of 2000 Pounds)

Region.	Total All Grades*	Total Sulphite	Bleached Sulphite	Unbleached Sulphite	Total Sulphate	Bleached Sulphate	Unbleached Sulphate	Ground-wood
West Coast	1,011,421	560,726	313,203	247,523	194,740	27,324	167,416	255,955
New England	905,390*	374,339	219,369	154,970	-----	-----	-----	531,051
New York & Pennsylvania	448,079	210,011	120,215	89,796	-----	-----	-----	238,068
Lake States	879,058*	371,474	218,381	153,093	251,513*	44,711	206,802*	256,071
South	1,139,162	66,966	60,369	6,597	1,051,620	96,673	954,947	20,576
Totals	**4,383,160**	**1,583,516**	**931,537**	**651,979**	**1,497,873**	**168,708**	**1,329,165**	**1,301,721**

*Production of Unbleached Sulphate in New England included in Lake States to avoid disclosing individual mill's figures.
[1] Except Soda Pulp. About 15,000 tons of Soda Pulp was produced on the Pacific Coast in 1935.—(Editor).
Total United States production of all grades of Wood Pulp except Soda, Miscellaneous and Off-Quality Pulp, estimated on the basis of monthly reports to the United States Pulp Producers Association by mills representing 94% of the industry's total capacity.

TOTAL UNITED STATES PRODUCTION OF WOODPULP
By Grades—1925-1935*

(Tons of 2000 pounds)

Year.	Total	Unbleached Sulphite	Bleached Sulphite	Total Sulphate	Groundwood	Soda	All Other
1925	3,962,217	790,510	612,576	409,768	1,612,019	472,647	64,697
1926	4,394,766	911,729	646,466	519,960	1,764,248	496,920	55,463
1927	4,313,403	872,411	680,288	603,253	1,610,409	487,478	59,564
1928	4,510,800	836,751	722,107	774,225	1,610,988	488,641	78,088
1929	4,862,885	848,754	839,953	910,888	1,637,653	520,729	104,908
1930	4,630,308	815,897	751,166	949,513	1,560,221	474,230	79,281
1931	4,409,344	675,859	740,812	1,034,291	1,449,240	374,054	135,088
1932	3,760,267	548,702	596,937	1,028,846	1,203,044	290,703	92,035
1933	4,329,248	543,957	742,662	1,263,222	1,197,553	581,854	
1934	4,281,428	599,905	806,612	1,240,967	1,253,398	294,089	86,457
1935	4,894,824	608,442	919,961	1,415,096	1,140,313	473,068	82,912

*Source: 1925-1933 U. S. Bureau of the Census. 1934 and 1935 data from United States Pulp Producers Association.

SUMMARY FOR 1935 OF UNITED STATES WOOD PULP PRODUCTION, SHIPMENTS and STOCKS*

Tons of 2,000 lbs., air dry weight

	Production	Used	Shipments: Domestic Market	Shipments: Export	Stocks on Hand End of Period: Own Use	Stocks on Hand End of Period: Market
Total All Grades (Except Soda) 1935[1]	4,166,724	3,611,028	422,814	157,228	58,799	28,842
Total[2] Sulphite	1,528,403	995,468	392,371	157,228	16,935	28,380
Total[3] Bleached Sulphite	919,961	529,928	309,680	91,921	5,933	24,389
Total[4] Unbleached Sulphite	608,442	465,540	82,691	65,307	11,002	3,991
Total[5] Bleached Sulphate	146,246	144,716	1,563	.....	905	.....
Total[6] Unbleached Sulphate	1,268,850	1,263,227	6,644	.....	5,045	.....
Total[7] Groundwood	1,140,313	1,126,709	20,206	.....	35,311	382
Total[8] Damaged, Off-Quality and Miscellaneous Grades	82,912	80,908	2,030	.....	603	80

*Source—United States Pulp Production Association.
[1] 172 mills whose capacity totals 94% of capacity of the United States.
[2] As reported by 74 sulphite mills whose capacity totals 90% of the sulphite capacity of the United States.
[3] As reported by 45 bleached sulphite pulp mills whose capacity totals 100% of the bleached sulphite capacity of the U. S.
[4] As reported by 62 unbleached sulphite mills whose capacity totals 98% of the unbleached sulphite capacity of the U. S.
[5] As reported by 11 mills, representing all mills producing bleached sulphate.
[6] As reported by 34 mills whose capacity totals 94% of sulphate capacity of the U. S.
[7] As reported by 99 mills whose capacity totals 92% of groundwood capacity of the U. S.
[8] As reported by 8 mills.

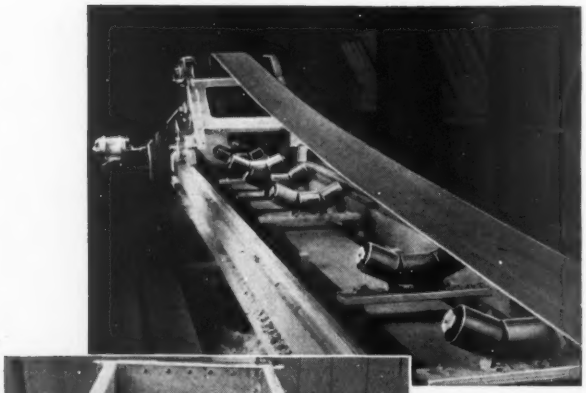
UNITED STATES WOOD PULP CAPACITY BY REGIONS
1934 – 1935*

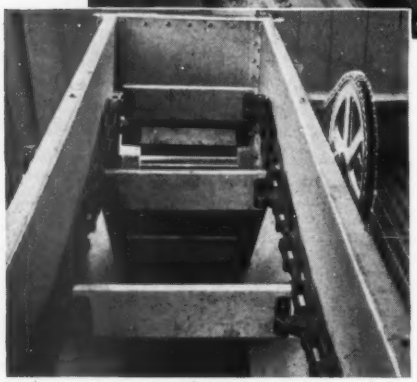
(Tons of 2000 pounds)

Region.	Total All Grades* 1934	Total All Grades* 1935	Sulphite 1934	Sulphite 1935	Sulphate 1934	Sulphate 1935	Groundwood 1934	Groundwood 1935
New England—Total	1,490,325	1,477,460	566,525	578,460	49,600	80,600	874,200	818,400
Active	1,405,230	1,373,920	550,250	548,390	31,000	62,000	823,980	763,530
Idle	85,095	103,540	16,275	30,070	18,600	18,600	50,220	54,870
New York and Pennsylvania	981,305	939,920	344,875	334,180	0	0	636,430	605,740
Active	791,585	763,530	318,525	290,160	----	0	473,060	473,370
Idle	189,720	176,390	26,350	44,020	----	0	163,370	132,370
Lake States	1,363,535	1,288,980	525,140	494,450	283,340	256,060	555,055	538,470
Active	1,339,665	1,232,870	509,640	472,750	283,340	256,060	546,685	504,060
Idle	23,870	56,110	15,500	21,700	0	0	8,370	34,410
West Coast	1,296,265	1,256,430	666,345	639,220	238,700	256,060	391,220	361,150
Active	1,207,450	1,184,820	636,430	639,220	192,200	195,300	378,820	350,300
Idle	88,815	71,610	29,915	.....	46,500	60,760	12,400	10,850
South	1,213,650	1,293,630	93,000	94,550	1,088,100	1,170,870	32,550	28,210
Active	1,188,850	1,268,830	93,000	94,550	1,063,300	1,146,070	32,550	28,210
Idle	24,800	24,800	0	0	24,800	24,800	0	0
Total	6,345,080	6,256,420	2,195,885	2,140,860	1,659,740	1,763,590	2,489,455	2,351,970
Active	5,932,780	5,823,970	2,107,845	2,045,070	1,569,840	1,659,430	2,255,095	2,119,470
Idle	412,300	432,450	88,040	95,790	89,900	104,160	234,360	232,500

*Except Soda and Special Grades of Pulp.
Source: Capacity—U. S. Pulp Producers Association's Basic Survey of the Pulp Industry. Rated annual capacity on 310-day basis. 1935 figures as of January 1st, 1936.

At Weyerhaeuser's New Pulp Mill





ABOVE: Head end of 18" wide belt conveyor handling sulphur to storage bins. Capacity 75 tons per hour.

LEFT: Hogged fuel flight conveyor in boiler room for distributing fuel to boilers.

5784

● Complete Link-Belt conveying systems, engineered to fit conditions, handle sulphur, chips and hogged fuel with greatest efficiency and lowest cost at this modern mill.

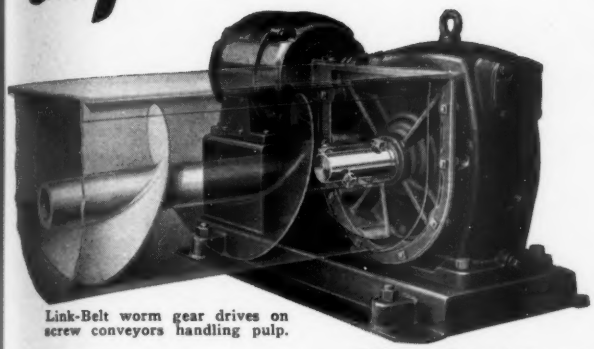
Sulphur is unloaded from ships to a portable hopper, equipped with a reciprocating feeder, and conveyed over three portable conveyors and a 727-ft. centers belt conveyor to storage bins. These bins are equipped with six reciprocating feeders which deliver to another belt conveyor which in turn delivers to a Helicoid screw conveyor to the melting room.

Chips are handled from storage bin to digesters by anti-friction belt conveyors.

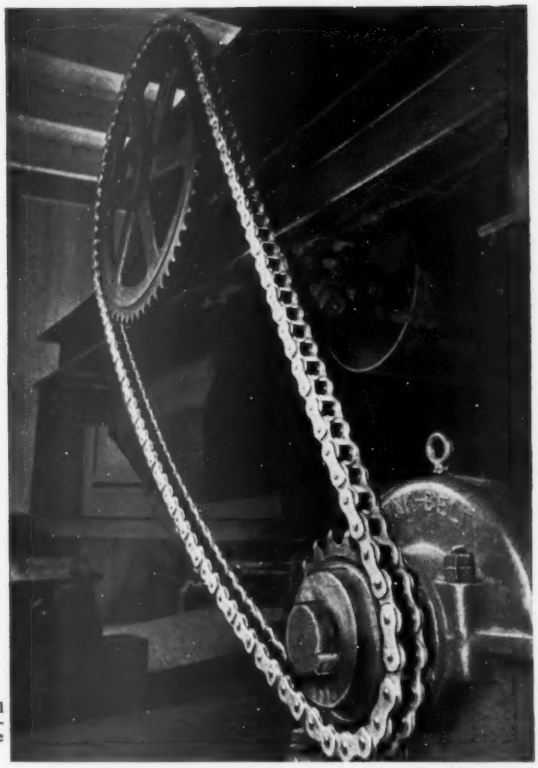
Hogged fuel is handled from cut-up mill and scows to boiler room by ten anti-friction belt conveyors and two rivetless chain distributing conveyors.

If you have a handling problem, put its solution up to experienced Link-Belt engineers. We build all types of equipment for the mechanical handling of materials. Address Link-Belt Company, Seattle, Portland, San Francisco, Los Angeles, or Oakland.

Drives by LINK-BELT



Link-Belt worm gear drives on screw conveyors handling pulp.



RIGHT: Herringbone gear speed reducer and roller chain drive operating chip conveyor shown on the opposite page.

At Weyerhaeuser's New Pulp Mill

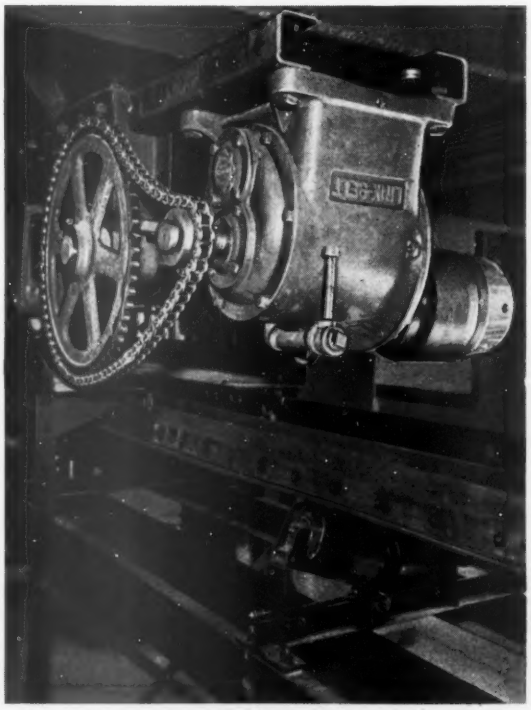
● All the Link-Belt conveying equipment at this new mill, as described on the opposite page, is driven by Link-Belt worm gear speed reducers, direct connected to motors or Link-Belt herringbone gear speed reducers and motorized speed reducers with final drives of Silverlink roller chain.

The Link-Belt line of drives includes everything for the positive transmission of power—speed reducers of the worm gear, herringbone gear and motorized helical gear types, P.I.V. Gear and V.R.D. variable speed transmissions, as well as roller chain and silent chain drives.

Let Link-Belt engineers recommend the type of drive to best fit the equipment and conditions. Their extensive experience is available to you.

Send for Binder No. 2100, which gives engineering data and complete information on the entire Link-Belt positive drive line.

Address Link-Belt Company, San Francisco, Seattle, Portland, Los Angeles, or Oakland.



Motorized speed reducer and Silverlink roller chain drive operating reciprocating feeder from sulphur storage bin.

5784

ESTIMATED UNITED STATES CONSUMPTION OF WOODPULP

By Grades—1925-1935*

(Tons of 2000 pounds)

Year.	Total	Unbleached Sulphite	Bleached Sulphite	Total Sulphate	Groundwood	Soda	All Other
1925	5,590,214	1,426,610	921,291	772,079	1,943,111	469,897	57,226
1926	6,095,279	1,603,433	964,952	913,024	2,068,007	495,127	50,736
1927	5,960,915	1,546,349	1,015,172	997,438	1,856,008	485,208	60,740
1928	6,239,814	1,541,817	1,054,512	1,217,573	1,860,187	485,907	79,818
1929	6,696,322	1,612,459	1,192,370	1,358,181	1,911,114	518,533	103,665
1930	6,414,760	1,543,265	1,095,312	1,371,847	1,859,453	474,369	70,514
1931	5,952,741	1,255,770	1,074,334	1,453,501	1,659,804	376,040	133,292
1932	5,194,367	1,094,831	922,381	1,402,954	1,391,509	291,224	91,468
1933	6,189,602	1,225,537	1,153,778	1,821,656	1,407,832	580,799	
1934	5,969,633	1,217,097	1,148,891	1,776,471	1,442,772	301,552	82,850
1935	6,659,811	1,256,161	1,257,463	2,026,438	1,330,354	480,585	80,475

*Consumption: Production plus imports minus exports.

REGIONAL PERCENTAGES OF UNITED STATES WOOD PULP PRODUCTION

Total and by Grades in 1934 and 1935[1]

Region.	Sulphite 1934	Sulphite 1935	Sulphate 1934	Sulphate 1935	Groundwood 1934	Groundwood 1935	Total 1934	Total 1935
New England	23%	24%	0%	*	42%	41%	22%	21%*
New York and Pennsylvania	12%	13%	0%	0%	18%	18%	10%	10%
Lake States	25%	23%	13%	17%*	20%	19½%	20%	20%*
South	4%	4%	73½%	70%	1%	2%	25%	26%
West Coast	36%	36%	13½%	13%	19%	19½%	23%	23%

[1] Does not include soda pulp miscellaneous grades and off-quality pulp.
*Production of unbleached sulphate in New England included in Lake States to avoid disclosing the individual mill's figures.
Source: Based on monthly reports to the United States Pulp Producers Association by mills representing 94% of the industry's total capacity.
*Production and capacity of unbleached sulphate in New England included in Lake States to avoid disclosing individual mill's figures.
Source: United States Pulp Producers Association.

ESTIMATED 1935 UNITED STATES WOOD PULP PRODUCTION AS PER CENT OF ACTIVE CAPACITY, BY REGION AND GRADES

Region.	Sulphite Bleached	Sulphite Unbleached	Sulphate Bleached	Sulphate Unbleached	Ground-wood	Total
New England	66%	72%	0%	*	70%	69%*
New York and Pennsylvania	83%	62%	0%	0%	50%	59%
Lake States	82%	74%	120%	74%*	51%	68%*
South	72%	61%	99%	91%	73%	90%
West Coast	93%	82%	135%	96%	73%	85%
Total for U. S.	80%	74%	109%	88%	61%	75%

*Production and capacity of unbleached sulphate in New England included in Lake States to avoid disclosing individual mill's figures.
Source: United States Pulp Producers Association.

PULP WOOD CONSUMPTION—1923-1935

Pacific Coast States and British Columbia

	1923 Cords	1924 Cords	1925 Cords	1926 Cords	1927 Cords	1928 Cords
Washington	191,751	230,299	241,150	305,787	455,664	651,657
Oregon and California	205,199	205,968	209,349	232,989	267,233	308,264
British Columbia*	267,000	266,000	284,100	318,500	364,000	383,008
Total Pacific Coast	**663,950**	**702,267**	**734,599**	**857,276**	**1,076,899**	**1,342,929**

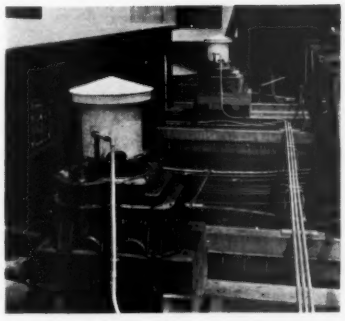
	1929 Cords	1930 Cords	1931 Cords	1932 Cords	1933 Cords	1934 Cords	1935‡ Cords
Washington	956,132	1,000,001	1,025,878	688,326	1,094,852	1,334,000	1,412,124
Oregon and California	340,745	351,053	319,876	265,470	241,841	288,000	538,076
British Columbia*	352,444	373,397	363,688	304,185	375,450	428,287	402,000
Total Pacific Coast	**1,649,321**	**1,724,451**	**1,709,442**	**1,257,981**	**1,712,143**	**2,050,287**	**2,352,200**

Source—U. S. figures from U. S. Dept. of Commerce, Bureau of Census; B. C. Figures from Dept. of Lands, Forest Branch; and Dominion Bureau of Statistics.
*British Columbia figures prior to 1928 are not shown separately and are estimated on basis of 1.23 cords of wood consumed per ton of wood pulp produced.
‡Estimated.

WESTERN GEAR DRIVES *in the New* WEYERHAEUSER PULP MILL

Pulp Drying Machine Drives

Chain Conveyors in Wood Room



Blending Tank Drives

WESTERN SPEED REDUCERS in the new Weyerhaeuser pulp mill at Everett transmit power to drive equipment from the wood preparation plant through to the pulp drying machine.

Pacific Coast pulp and paper mills have been using WESTERN SPEED REDUCERS for years. They have found WESTERN units operate with smooth, trouble-proof efficiency year after year under the most severe conditions.

WESTERN Offers Prompt, Reliable Service

Give us the facts and our engineers will select the proper gear unit for your drive.

Helical • Spur • Spiral Bevel • Worm Helical

MOTORIZED REDUCERS

Western Gear Works

SEATTLE, WASH.

Associated with **PACIFIC GEAR & TOOL WORKS** Incorporated

SAN FRANCISCO PORTLAND PACIFIC GEAR PRODUCTS EL PASO LOS ANGELES

"Gear Products From Gear Specialists"

WESTERN GEARS

UNITED STATES

Paper and Woodpulp Production and Consumption
Consumption of Domestic and Imported Pulpwood and Total Pulpwood Consumption

Specified Years, 1899-1935

Year—	PAPER		WOODPULP		CONSUMPTION OF PULPWOOD		
	Production (tons)	Consumption (tons)	Production (tons)	Consumption (tons)	Domestic (cords)	Imported (cords)	Total (cords)
1899	2,167,593	2,158,000	1,179,525	1,216,254	1,617,093	369,217	1,986,310
1904	3,106,696	3,049,824	1,921,768	2,091,006	2,477,099	573,618	3,050,717
1909	4,216,708	4,224,000	2,495,523	2,856,593	3,207,653	793,954	4,001,607
1914	5,270,047	5,496,164	2,893,150	3,556,377	3,641,063	829,700	4,470,763
1917	5,919,647	6,255,725	3,509,939	4,148,600	4,706,327	773,748	5,480,075
1918	6,051,523	6,387,066	3,313,861	3,869,746	4,506,276	744,518	5,250,794
1919	6,190,361	6,479,490	3,517,952	4,113,911	4,445,817	1,032,015	5,477,832
1920	7,334,614	7,846,827	3,821,704	4,696,035	5,014,513	1,099,559	6,114,072
1921	5,356,317	6,053,915	2,875,601	3,544,218	3,740,406	816,773	4,557,179
1922	7,017,800	8,007,088	3,521,644	4,756,105	4,498,808	1,050,034	5,548,842
1923	8,029,482	9,339,573	3,788,672	5,149,695	4,636,789	1,236,081	5,872,870
1924	.....	.....	3,723,266	5,216,265	4,720,191	1,047,891	5,768,082
1925	9,182,204	10,590,090	3,962,217	5,590,304	5,005,445	1,088,376	6,093,821
1926	.....	.....	4,394,766	6,096,279	5,489,517	1,276,490	6,766,007
1927	10,002,070	11,915,233	4,313,403	5,960,865	5,526,889	1,224,046	6,750,935
1928	10,403,338	12,447,841	4,510,800	6,239,641	5,750,689	1,409,411	7,160,100
1929	11,140,235	13,347,925	4,862,885	6,704,341	6,411,566	1,233,445	7,645,011
1930	10,169,140	12,314,819	4,630,308	6,463,185	6,089,852	1,105,672	7,195,524
1931	9,381,840	11,403,850	4,409,344	6,005,718	5,896,446	826,320	6,722,766
1932	7,997,872	9,733,764	3,760,267	5,083,446	4,891,424	741,699	5,633,123
1933	9,190,017	10,919,391	4,293,344	6,027,088	5,933,295	628,379	6,561,674
1934	9,186,266	11,185,682	4,281,428	5,969,633	5,943,223	973,978	6,917,201
1935	10,308,000	12,490,886	4,894,824	6,659,811	6,462,668	1,037,332	7,500,000

Source: Bureau of the Census, Federal Trade Commission, United States Forest Service and A. P. & P. A.
Cords: 128 cubic feet.
*Pulpwood requirement is a computed figure which represents the pulpwood required to manufacture the total paper consumption of a year.
§Not strictly comparable with other data under same head. Refers to wood actually imported during the year, whereas other figures refer to imported wood actually consumed during year.

UNITED STATES

Total Domestic Woodpulp Production, by Grades, From 1899 to 1935

In Tons of 2,000 Lbs.

Year	Total	Groundwood	Sulphite	Soda	Sulphate
1935	4,894,824	1,140,313	1,528,403	473,068	1,415,096
1934	4,436,128	1,296,535	1,446,044	411,686	1,246,269
1933	[10]4,293,344	1,197,553	1,306,575	495,930	1,259,351
1932	3,760,267	1,203,044	1,145,639	290,705	1,028,846
1931	4,409,344§	1,449,240	1,416,671	460,682	1,034,291
1930	4,630,308‡	1,560,221	1,567,063	504,443	949,513
1929	4,862,885†	1,637,653	1,668,707	561,210	910,888
1928	[4]4,510,800	1,615,689	1,595,951	488,641	780,552
1927	[4]4,313,403	1,618,638	1,588,132	487,478	607,172
1926	[4]4,394,766	1,774,192	1,599,776	496,920	523,878
1925	[3]3,962,217	1,629,689	1,447,191	472,647	412,690
1924	[3]3,723,266	1,643,283	1,336,551	440,697	302,735
1923	[3]3,788,672	1,580,553	1,448,690	445,162	314,267
1922	[3]3,521,644	1,483,787	1,374,319	419,857	243,681
1921	[2]2,875,601	1,267,382	1,166,926	300,533	140,760
1920	3,821,704	1,583,914	1,585,834	463,305	188,651
1919	[1]3,517,952	1,518,829	1,419,829	411,693	120,378
1918	3,313,861	1,364,504	1,456,633	350,362	142,362
1917	3,509,939	1,535,953	1,451,757	437,430	84,799
1916	3,435,001	1,508,139	1,466,402	387,021	73,439
1914	[2]2,893,150	1,293,661	1,151,327	347,928	52,641
1911	2,686,134	*	*	*	*
1910	2,533,976	*	*	*	*
1909	2,495,523	1,179,266	1,017,631	298,626	...
1908	2,118,947	*	*	*	*
1907	2,547,879	*	*	*	*
1904	1,921,768	968,976	756,976	196,770	.....
1899	1,179,525	586,374	416,037	177,114	

§Includes 48,460 tons of screenings as follows: mechanical, 10,115; chemical, 38,345.
‡Includes 49,068 tons of screenings, as follows: mechanical, 6,611; chemical, 42,457.
*Not reported separately.
†Includes 64,427 tons of screenings, as follows: mechanical, 11,459; chemical, 52,968.
[1]Includes data for screenings, as follows: Mechanical, 4,701 tons; sulphite, 37,093; sulphate, 6,327.
[2]Includes data for screenings, as follows: Mechanical, 8,229 tons; sulphite, 35,433; sulphate, 3,919.
[3]Includes data for screenings as follows: Mechanical, 9,944 tons; sulphite, 41,601; sulphate, 3,918.
[4]Includes data for screenings as follows: Mechanical, 17,670 tons; sulphite, 44,105; sulphate, 2,922.
[5]Includes data for some screenings.
[6]Includes data for screenings as follows: Mechanical, 12,759 tons; sulphite, 37,463; sulphate, 1,784.
[7]Includes data for screenings as follows: Mechanical, 12,220 tons; chemical, not shown by process, 35,003.
[8]Includes data for screenings as follows: Mechanical, 11,769 tons: chemical, not shown by process, 35,824.
1935 figures from United States Pulp Producers Association include 82,912 tons of damaged, off-quality and miscellaneous grades.

WOOD-PULP PRODUCTION, BY STATES
1931-1932-1933

(Revised)
Source: Department of Commerce.

	Wood pulp produced (tons of 2,000 lbs). 1931	1932	1933
United States	**4,409,344**	**3,760,627**	**4,293,344**
State—			
Louisiana	260,765	289,021	382,983
Maine	889,416	764,834	778,670
Massachusetts	23,785	14,210	12,387
Minnesota	148,369	134,509	154,522
New Hampshire	.....	.....	78,802
New York	466,510	353,867	393,615
Oregon	237,532	187,133	189,332
Pennsylvania	160,023	130,149	123,758
Vermont	25,601	included in [1]	18,000
Virginia	223,417	207,660	241,803
Washington	580,016	420,529	583,770
Wisconsin	586,271	476,228	532,610
Other tSates	657,528	628,804	649,418

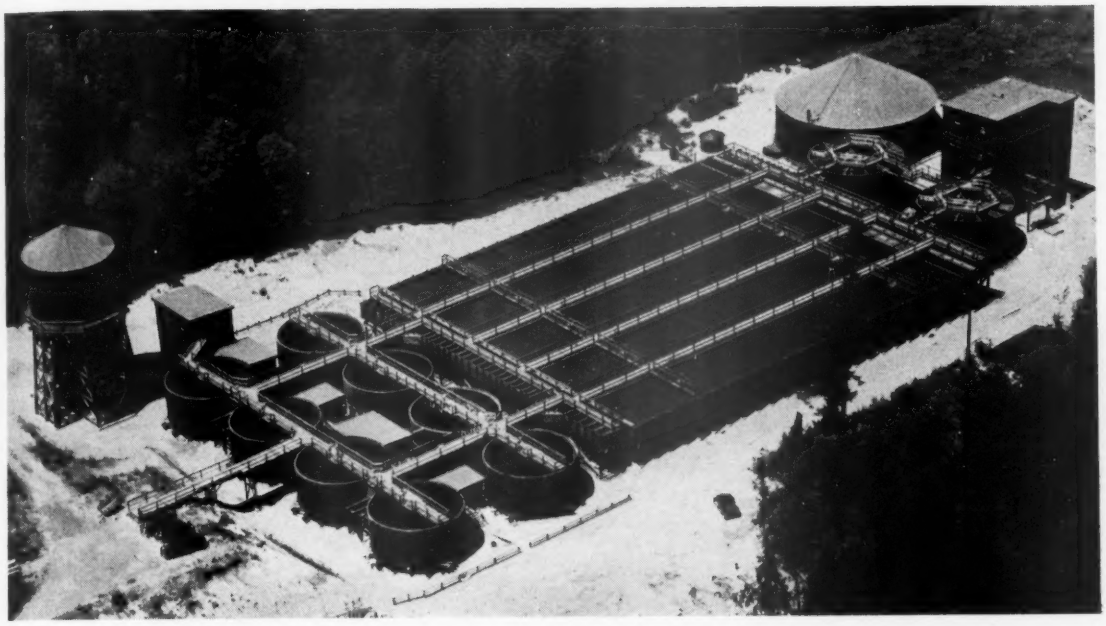
[1]Combined to avoid disclosing, exactly or approximately, the output of individual establishments.

PULPWOOD IMPORTS

(Unit: 1 Cord—128 Cu. Ft.)

	Rough	Peeled	Rossed	Total
1935	99,659	937,248	425	1,037,332
1934	180,019	789,158	4,801	973,978
1933	119,852	591,812	11,544	723,208
1932	114,366	531,158	2,664	648,188
1931	186,613	817,926	17,128	1,021,667
1930	331,158	1,234,678	16,365	1,582,201

Source: Department of Commerce, Bureau of Foreign and Domestic Commerce.



The 16,000,000 gallons per day water filter plant capable of ultimate expansion to 25,000,000 gallons per day.

PURE WATER
for
WEYERHAEUSER
at EVERETT

The water filter plant serving the new Weyerhaeuser unbleached sulphite pulp mill at Everett, Washington, is probably the largest all wood water filter plant ever constructed.

Water from the City of Everett's domestic system is filtered and treated for use in the Weyerhaeuser pulp mill.

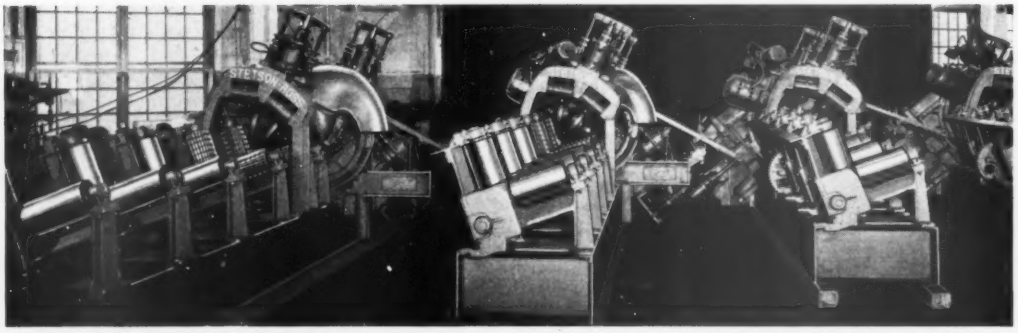
The filter plant was designed in cooperation with and built under the supervision of Mr. O. C. Schoenwerk, consulting engineer, who designed and constructed the Weyerhaeuser Everett pulp mill.

SHIBLEY COMPANY

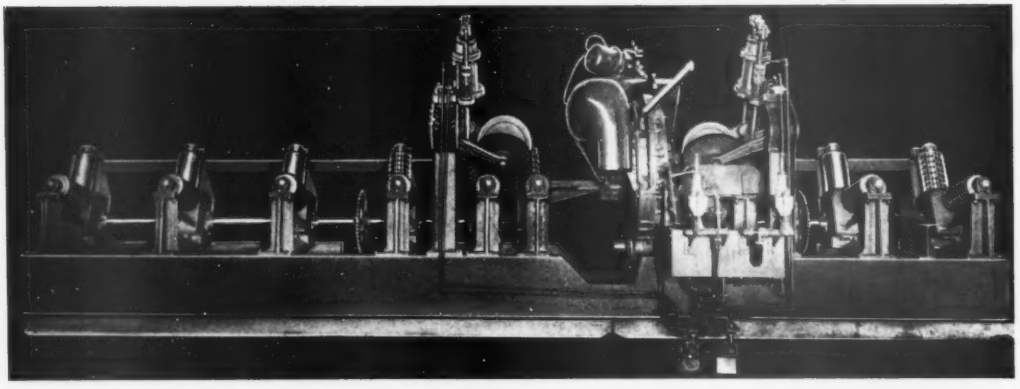
WATER TREATMENT ENGINEERS

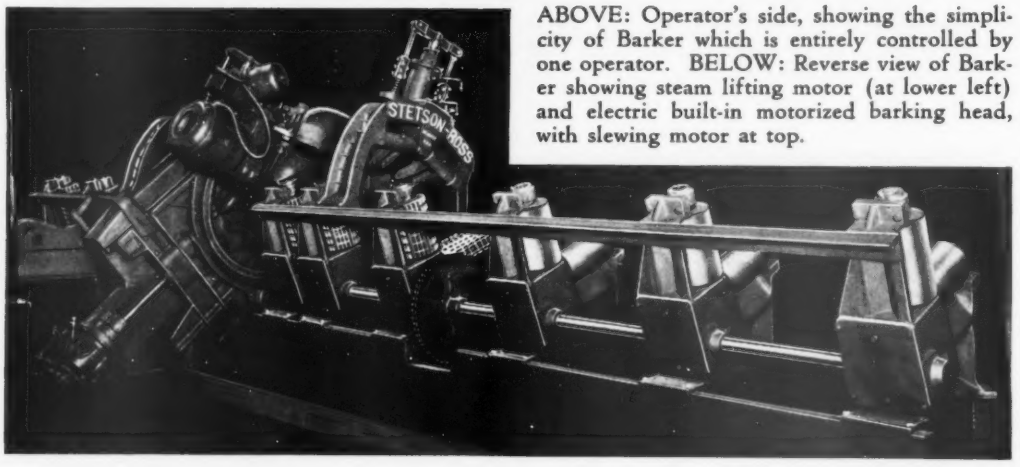
1201 Textile Tower SEATTLE SEneca 0366

The New Stetson-Ross "43"
PATENTED
Log Section Barking Machine



Here is shown a battery of four Barkers, complete and ready for shipment to the Weyerhaeuser Timber Company, Pulp Division, Everett, Washington. Note tilted, right-angle roll feed works.





ABOVE: Operator's side, showing the simplicity of Barker which is entirely controlled by one operator. BELOW: Reverse view of Barker showing steam lifting motor (at lower left) and electric built-in motorized barking head, with slewing motor at top.

«« PATENTED IN U. S. AND CANADA »»

Sections sawn from logs of any size (from 8" to 40") may be barked on these machines.

STETSON
MACHINE CO
SEATTLE, WAS

SUGGESTIO
For SAWING
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INTO SECTIO
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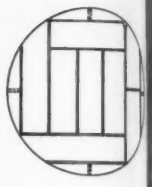

Minimiz es W
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From C arry
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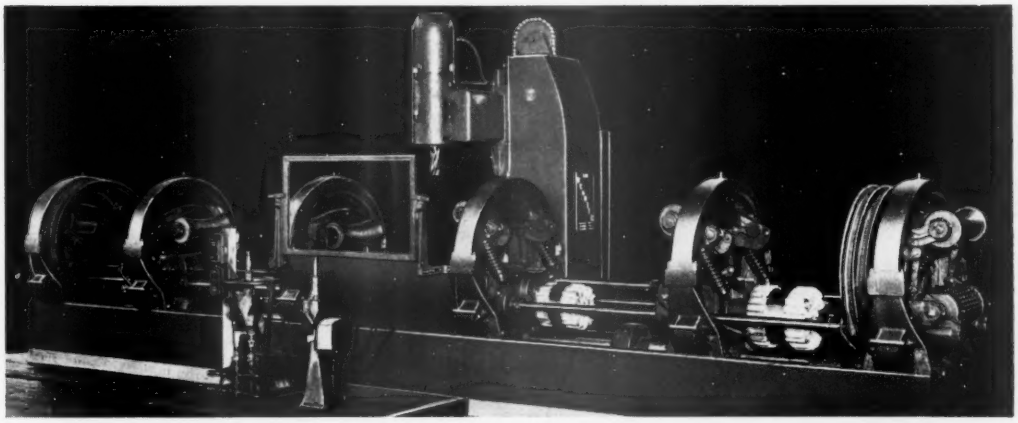
We will gladly end
engineering depart
of Pulp Mills a chart
20 differen suggest
sawing logs, from 8
in diameter. Merely
reques to . . .

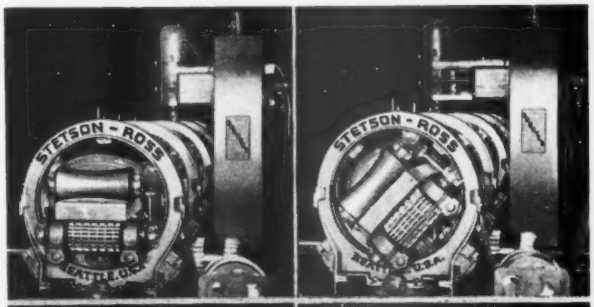
Another Stetson-Ross Achievement

HIGH FREQUENCY "44" *Electric* BROUTER WITH "47" *Electric* FEEDER and TURNER



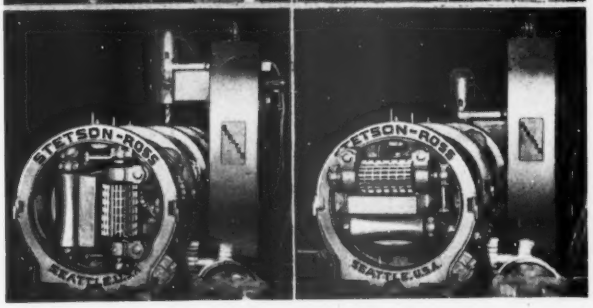
One of a battery of four S-R Brouters, recently installed in the new wood room of the Grays Harbor Pulp and Paper Co., Hoquiam, Washington. These machines have introduced a revolutionary method of pulpwood cleaning. Knots are bored out, and ingrown bark and other defects routed. Hence, the name, "Brouter." A 45-H.P. motor, operating at 10,800 R.P.M., makes this a high production machine.

RIGHT: Log section enters "47" Electric Feeder and Turner and is gripped between rolls, electrically clamped by motor mounted within the ring. It is then fed forward for first inspection and brouting.



LEFT: Log section is turned to any angle and fed forward or backward to any position for further inspection and brouting. All the while securely clamped at any position or angle.

RIGHT: Motors built within the ring feed stock forward or backward while it is being turned—to any angle.



LEFT: Stock may be turned three or more complete revolutions (either to right or left), while being fed forward or backward. This allows complete inspection and perfect cleaning — all rapidly accomplished by but one operator.

««« PATENTS APPLIED FOR »»»

Suitable Barker Heads may be used in connection with "47" Electric Feeder and Turner for barking round logs or sections. Feed rolls may be changed to conform. (This use covered in patent application.)

We welcome inquiries on these machines or any other equipment that we manufacture. Individual requirements studied and needed machinery developed. Write, or phone (Seattle, MAin 4188).

UNITED STATES

Pulpwood Consumption and Wood-Pulp Production, by States—1926-1933

Quantity and Cost of Wood Consumed
Quantity of Pulp Produced

Source: Census of Manufactures.

(Statistics are given for all States for which separate figures can be published without disclosing, exactly or approximately, the data reported by individual establishments Certain of the "Other States," however, are more important in the industry than some of the States shown separately).

States—	Year	Wood Consumed — Quantity (cords)	Wood Consumed — Cost f.o.b. Mill — Total	Wood Consumed — Cost f.o.b. Mill — Average per cord	Wood Pulp produced (tons of 2,000 lbs.)
United States	1933	6,561,674	$48,360,790	$7.37	4,293,344
	1932	5,633,123	$51,769,093	$9.19	3,760,267
	1931	[1]6,722,766	$73,524,059	$10.94	[1]4,409,344
	1930	*7,195,524	88,683,502	12.32	4,630,308
	1929	7,645,011	100,054,139	13.09	4,862,885
	1928	*7,160,100	97,024,190	13.55	4,510,800
	1927	6,750,935	95,452,365	14.29	4,313,403
Individual States:					
Washington	1933	1,094,852	5,345,145	4.88	583,770
	1932	688,326	4,354,452	6.70	420,529
	1931	1,025,878	7,252,770	7.07	580,016
	1930	1,000,001	6,883,484	6.88	566,137
	1929	956,132	6,527,585	6.83	523,948
	1928	651,657	4,781,566	7.34	349,107
	1927	445,664	3,588,506	8.05	268,349
Maine	1933	980,375	10,294,033	10.50	778,670
	1932	948,749	13,000,940	13.70	764,834
	1931	1,122,368	17,326,636	15.58	889,416
	1930	1,203,377	19,833,906	16.48	905,088
	1929	1,311,577	22,281,806	16.99	981,433
	1928	1,309,988	22,602,624	17.25	970,690
	1927	1,273,268	21,850,760	17.16	942,162
Wisconsin	1933	864,779	7,257,686	8.39	532,610
	1932	769,591	7,302,919	9.75	476,228
	1931	956,659	11,319,105	11.83	586,271
	1930	1,168,789	14,710,447	12.59	701,011
	1929	1,233,962	15,632,746	12.67	733,617
	1928	1,225,630	15,869,381	12.95	720,781
	1927	1,199,615	15,174,013	12.65	690,921
Louisiana	1933	584,217	2,295,315	3.93	382,983
	1932	449,151	1,759,642	3.92	289,021
	1931	431,425	2,047,236	4.75	260,765
	1930	422,710	2,385,417	5.64	243,915
	1929	459,553	2,671,881	5.81	246,590
	1928	413,602	2,429,247	5.87	226,708
	1927	349,272	2,056,671	5.89	179,878
New York	1933	478,727	6,379,253	13.32	393,615
	1932	437,640	6,843,337	15.64	353,867
	1931	583,370	10,388,934	17.81	466,510
	1930	763,451	14,200,286	18.60	596,219
	1929	826,312	15,987,105	19.35	662,988
	1928	802,115	14,962,631	18.65	633,182
	1927	872,780	16,882,733	19.34	710,227
Virginia	1933	387,513	2,159,190	5.56	241,803
	1932	337,585	2,613,496	7.75	207,660
	1931	368,030	3,049,937	8.29	223,417
	1930	378,421	3,812,361	10.07	216,365
	1929	375,179	4,143,285	11.04	206,050
	1928	342,813	3,942,477	11.50	189,925
	1927	316,032	3,775,393	11.95	170,630
Michigan	1933	252,295	1,941,931	7.69	153,674
	1932	216,285	1,682,232	7.77	153,323
	1931	251,197	2,937,046	11.69	150,111
	1930	279,986	3,725,080	13.40	193,418
	1929	313,477	4,422,317	14.11	178,015
	1928	331,697	4,634,972	13.97	196,203
	1927	351,688	4,712,584	13.40	193,539
Oregon	1933	241,841	1,453,780	6.01	189,332
	1932	265,470	1,737,597	6.54	187,133
	1931	319,876	2,584,712	8.08	237,532
	1930	351,053	2,963,962	8.44	248,592
	1929	340,745	3,157,499	9.27	256,546
	1928	308,264	3,094,255	10.04	213,407
Minnesota	1933	235,011	1,647,021	6.58	154,522
	1932	211,245	1,825,524	8.64	134,509
	1931	197,587	2,118,058	10.72	148,369
	1930	230,471	2,688,294	11.66	182,456
	1929	266,320	2,780,312	10.44	189,664
	1928	282,691	3,365,081	11.90	194,399
	1927	281,156	3,397,201	12.08	191,220
Pennsylvania	1933	224,076	2,734,374	12.20	123,758
	1932	237,486	3,409,198	14.35	130,149
	1931	292,615	4,662,606	15.93	160,023
	1930	352,775	5,703,253	16.17	188,943
	1929	397,680	6,930,456	17.43	213,083
	1928	405,276	7,016,656	17.31	218,598
	1927	398,021	7,171,606	18.02	216,587
New Hampshire	1933	155,140	1,349,213	8.09	78,802
	†1930	242,756	4,527,619	18.65	138,332
	1929	376,014	7,375,455	19.61	212,774
	1928	351,349	6,843,713	19.48	198,587
	1927	358,376	6,958,956	19.42	200,324
Massachusetts	1933	19,599	232,474	11.86	12,387
	1932	20,420	280,579	13.74	14,210
	1931	33,438	535,918	16.03	23,785
Vermont	1933	16,011	227,619	14.21	18,000
	‡1931	24,633	326,546	13.26	25,601
	1930	24,224	362,784	15.02	25,047
	1929	25,486	447,168	17.55	26,307
	1928	20,081	330,702	16.47	19,831
	1927	31,795	549,741	17.29	32,562
Other States[2]	1933	1,027,238	5,043,756	4.91	649,418
	1932	1,024,175	6,759,177	6.60	628,804
	1931	[1]1,125,690	8,974,555	7.97	[1]657,528
	1930	*734,110	6,116,411	8.33	395,407
	1929	717,474	6,909,782	9.63	402,378
	1928	*663,612	6,176,561	9.31	347,012

*Includes data for small quantity of spent licorice root with no market value.

[1]Includes data for a small quantity of spent licorice root of no market value.

[2]Alabama, Arkansas, Delaware, Florida, Maryland, Mississippi, New Hampshire, New Jersey, North Carolina, Ohio, South Carolina, Tennessee, West Virginia and Vermont.

†1931 and 1932 figures included in other states.

‡1932 figures included in other states.

VALUE AND QUANTITY OF WOOD-PULP PRODUCTION, BY STATES—1933

Source: Department of Commerce

This table represents statistics for all states for which separate figures can be published without disclosing exactly or approximately, the data reported by individual establishments. Certain of the "other states," however, are more important in the industry than some of the states shown separately.

	Wood Pulp Produced Tons (2,000 lbs.)	Value
United States	**4,293,344**	**$124,556,465**
States—		
Wisconsin	532,610	18,959,678
Washington	583,770	18,803,093
Maine	778,670	18,580,679
New York	393,615	12,347,527
Louisiana	382,983	7,833,513
Virginia	241,803	7,404,277
Pennsylvania	123,758	6,181,800
Michigan	153,674	5,281,025
Oregon	189,332	5,040,341
New Hampshire	78,802	4,546,495
Minnesota	154,522	4,467,056
Massachusetts	12,387	513,361
Vermont	18,000	353,822
Other States[1]	649,418	14,243,798

[1] Alabama, Arkansas, Delaware, Florida, Maryland, Mississippi, New Jersey, North Caroline, Ohio, South Carolina, Tennessee and West Virginia.

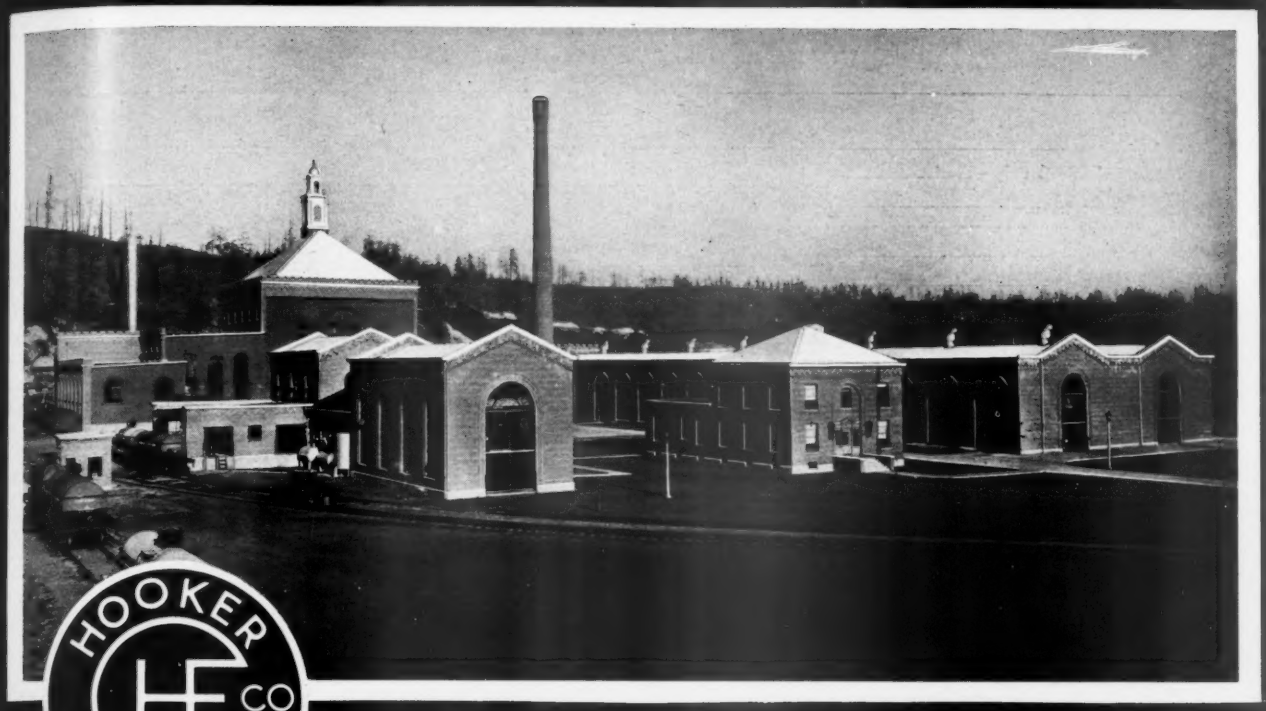
PULPWOOD CONSUMPTION—QUANTITY, BY STATES—1931-1932-1933

Source: Department of Commerce

This table presents statistics for all States for which separate figures can be published without disclosing, exactly or approximately, the data reported by individual establishments. Certain of the "Other States", however, are more important in the industry than some of the States shown separately.

	Total quantity consumed 1931 (cords)	1932 (cords)	1933 (cords)
United States	**6,722,766**	**5,633,123**	**6,561,674**
State—			
Louisiana	431,425	449,151	584,217
Maine	1,112,368	948,749	980,315
Massachusetts	33,438	20,420	19,599
Michigan	251,197	216,285	252,295
Minnesota	197,587	211,245	235,011
New Hampshire	150,568	included in [1]	155,140
New York	538,370	437,640	478,727
Oregon	319,876	265,470	241,841
Pennsylvania	292,615	237,486	224,076
Vermont	24,633	included in [1]	16,011
Virginia	368,030	337,585	387,513
Washington	1,025,878	688,326	1,094,857
Wisconsin	956,659	796,591	864,779
Other States[1]	975,122	1,024,175	1,027,238

[1]Alabama, Arkansas, Delaware, Florida, Maryland, Mississippi, New Jersey, North Carolina, Ohio South Carolina, Tennessee, West Virginia, (New Hampshire and Vermont for 1932.)



CAUSTIC SODA
LIQUID CHLORINE
FOR THE NORTHWEST

Appreciating the diversified uses of Caustic Soda and Liquid Chlorine, the Hooker Company offers the technical services of an experienced engineering staff. Mills in the east and south as well as the west have used Hooker service to help solve their operating problems. At Tacoma, Washington, are maintained plant, laboratories, field staff and administrative personnel to serve west coast industries.

WESTERN PLANT, Tacoma, Washington
Western Sales Office, Tacoma, Washington

EASTERN PLANT, Niagara Falls, N. Y.
Eastern Sales Office, 60 East 42nd St., New York

HOOKER ELECTROCHEMICAL COMPANY

MURIATIC ACID · BLEACHING POWDER · MONOCHLORBENZENE · PARADICHLORBENZENE
BENZOATE OF SODA · BENZOIC ACID · BENZOYL CHLORIDE · BENZYL ALCOHOL
SULFUR MONOCHLORIDE · SULFUR DICHLORIDE · SULFURYL CHLORIDE · SALT
FERRIC CHLORIDE · ANTIMONY CHLORIDE

UNITED STATES

Wood Pulp Imports by Grades and Countries of Origin—1935

SHORT TONS

Grade—	COUNTRY OF ORIGIN Canada	Finland	Germany	Norway	Sweden	Others	Total by Grades
Mechanical Wood Pulp—Total	136,112	24,490	.....	7,006	22,404	29	190,041
Unbleached	136,048	22,143	.....	3,317	10,666	29	172,203
Bleached	64	2,347	.....	3,689	11,738	.....	17,388
Sulphite—Total	293,177	175,716	80,255	68,946	446,577	57,798	1,122,449
Unbleached	67,404	146,166	50,024	16,539	377,320	35,573	693,026
Bleached	225,773	29,550	30,231	52,407	69,237	22,225	429,423
Sulphate—Total	94,748	66,286	.....	17,356	429,916	3,036	611,342
Unbleached	43,549	62,173	.....	17,328	400,654	2,980	525,684
Bleached	51,199	4,113	.....	28	29,262	56	84,658
All Others	9,587	.....	.....	.....	25	187	9,799
Total (By Countries)	**533,624**	**266,492**	**80,255**	**93,308**	**898,902**	**61,050**	**1,933,631**
Value	**$22,508,650**	**$8,890,747**	**$3,096,673**	**$3,837,380**	**$30,201,562**	**$2,145,975**	**$70,680,987**

Source—Import Statistics, U S Department of Commerce.

UNITED STATES

Wood Pulp Imports by Grades and Countries of Origin—1934
Long Tons of 2,240 Lbs.)

Grade—	COUNTRY OF ORIGIN Canada	Finland	Germany	Norway	Sweden	Others	Total by Grades
Mechanical Wood Pulp	139,815	8,126	.....	4,703	15,812	628	169,084
Sulphite—Total	260,287	132,616	81,980	69,407	374,237	40,174	958,601
Unbleached	80,867	112,562	47,319	22,529	314,984	24,856	603,117
Bleached	179,320	20,054	34,661	46,878	59,253	15,318	355,484
Sulphate—Total	77,019	52,367	.....	14,263	332,019	2,460	478,128
Unbleached	46,215	49,627	.....	13,811	317,740	2,460	429,853
Bleached	30,804	2,740	.....	452	14,279	.....	48,275
All Others	6,737	.....	11	.....	.....	54	6,802
Total (By Countries)	**483,758**	**193,109**	**81,991**	**88,373**	**722,068**	**43,316**	**1,612,615**
Value	**$20,302,452**	**$6,734,505**	**$3,264,548**	**$4,369,160**	**$25,624,868**	**$1,482,736**	**$61,778,269**

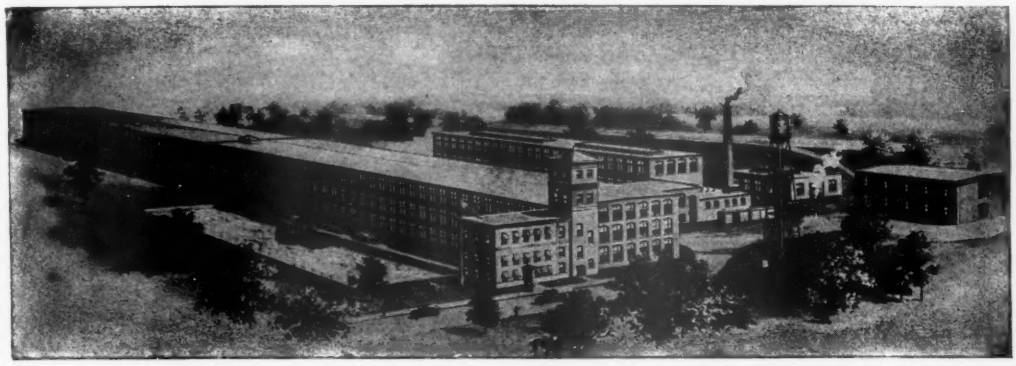
Source—Import Statistics, U. S. Department of Commerce.

UNITED STATES

Wood Pulp Imports—By Grades and Countries of Origin—1933
(Long Tons of 2,240 lbs.)

Grade—	COUNTRY OF ORIGIN Canada	Finland	Germany	Norway	Sweden	Others	Totals by Grades
Mechanical Wood Pulp	147,742	20,148	150	5,622	13,988	100	187,750
Sulphite—Total	271,291	138,439	76,459	82,900	411,948	62,599	1,043,636
Unbleached	76,537	116,019	43,895	26,597	346,684	33,271	643,003
Bleached	194,754	22,420	32,564	56,303	65,264	29,328	400,633
Sulphate—Total	29,634	49,288	848	16,513	375,583	1,764	473,630
Unbleached	29,634	47,039	848	16,271	366,424	1,764	461,980
Bleached	.....	2,249	.....	242	9,159	.....	11,650
All Other Pulps	28,457	.....	5	.....	.....	266	28,728
Total (By Countries)	**477,124**	**207,875**	**77,462**	**105,035**	**801,519**	**64,729**	**1,733,744**
Value	**$18,001,772**	**$6,453,588**	**$2,638,922**	**$3,867,528**	**$24,096,698**	**$2,340,502**	**$57,399,010**

Source—Import Statistics, U. S. Department of Commerce.



THE HOME OF ALBANY FELTS

Felts For:

Leather Board
Straw Board
Box Board
Bristol Board
Tissue
Bond
Writings
Insulation Board
Mulch Paper
Straw Paper
Wrappings
Glassine
Newsprint
Cellucotton
Wall Board
Soda Pulp
Sulphite Pulp
Building Papers
Asbestos Papers
Cement Shingles
Blotting
Book
Chip Board
News Board
Cover
Kraft
Ledger
Manila
Rope
Ground Wood Pulp
Binders Board
Toweling
Condenser Paper
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Catalogue
Envelope
Container Board
Hanging
Coating Boards
Coating Papers
Tag Board

SPECIALIZATION

Ours is a specialized business—that of making *good* paper machine felts. It is different from any other textile business in the world.

Our designers, spinners, weavers, research chemists, finishers, are all specialists with years of sound experience in felt making. Some of them have followed their particular line of work for 25 years.

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Our resources and world-wide experience have led the paper industry to bring all manner of problems to us involving the use of felts.

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ALBANY FELT COMPANY

ALBANY, NEW YORK

UNITED STATES

Wood Pulp Imports — By Grades and Countries of Origin — 1932
(Long Tons of 2,240 lbs.)

Grade—	COUNTRY OF ORIGIN Canada	Finland	Germany	Norway	Sweden	Others	Totals by Grades
Mechanical Wood Pulp	133,960	16,600		7,664	9,865	183	168,272
Sulphite—Total	206,924	107,287	80,515	78,373	317,629	44,007	834,735
Unbleached	56,335	95,579	42,330	31,402	270,894	19,667	516,207
Bleached	150,589	11,708	38,185	46,971	46,735	24,340	318,528
Sulphate—Total	37,283	45,278	482	13,285	227,226	1,316	324,870
Unbleached	17,411	43,756	482	12,961	225,578	1,316	301,504
Bleached	19,872	1,522	.....	324	1,648	.....	23,366
All Other Pulp	1,569	.....	.....	.....	.....	.....	1,569
Total (By Countries)	**379,736**	**169,165**	**80,997**	**99,322**	**554,720**	**45,506**	**1,329,446**

Source—Import Statistics, U. S. Department of Commerce.

UNITED STATES

Imports of Unbleached Sulphite—1920 to 1935
(Long Tons—2,240 Pounds)

	Sweden	Canada	Finland	Germany	Norway	All Others	Total
1920	73,957	207,667	13,502	7,193	3,627	2,062	308,008
1921	73,070	88,112	24,696	14,308	3,137	4,770	208,093
1922	193,218	146,690	27,642	16,968	29,134	4,048	422,700
1923	159,065	167,725	58,602	42,851	21,222	12,388	461,853
1924	226,978	192,308	48,007	54,944	26,079	13,554	561,920
1925	193,034	253,670	48,996	42,362	20,639	20,083	579,284
1926	244,925	226,153	61,804	54,305	18,613	23,123	628,923
1927	299,875	179,630	70,106	25,487	17,747	21,011	613,856
1928	297,130	179,751	92,778	23,933	23,456	23,607	640,660
1929	350,152	190,565	109,121	16,822	18,325	16,471	701,456
1930	331,968	180,417	99,881	19,049	20,210	14,152	665,075
1931	300,682	88,604	97,467	22,212	10,195	16,850	536,010
1932	270,894	56,335	95,579	42,330	31,402	19,667	516,207
1933	346,684	76,537	116,019	43,895	26,597	33,271	643,003
1934	314,984	80,867	112,562	47,319	22,529	24,856	603,117
1935 IMPORTS IN TONS OF 2,000 LBS.							
1935	377,320	67,404	146,166	50,024	16,539	35,573	693,026

Source: Department of Commerce, Bureau of Foreign and Domestic Commerce.

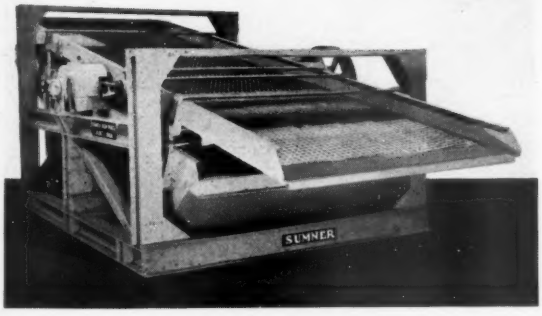
UNITED STATES IMPORTS OF BLEACHED SULPHITE FROM 1920 TO 1935

By Countries of Origin
(Long Tons of 2,240 Pounds)

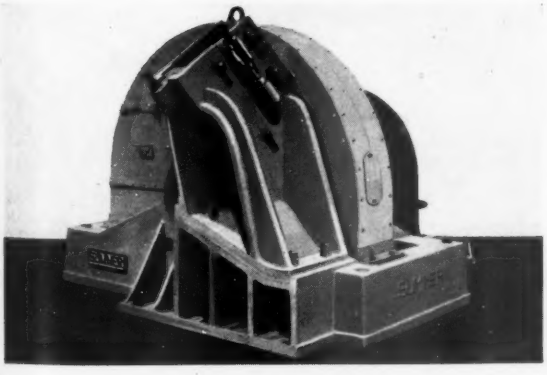
Countries—	Canada	Sweden	Germany	Norway	Finland	All Others	Total
1920	86,055	6,788	200	13,435	5,329	2,663	114,470
1921	59,198	5,770	1,335	8,180	7,591	2,931	85,005
1922	122,347	39,340	3,152	39,153	5,393	3,708	213,093
1923	132,138	41,958	12,655	46,849	12,063	4,917	250,580
1924	135,943	64,221	17,054	35,279	6,960	12,912	272,369
1925	137,598	71,577	16,662	48,111	4,130	8,898	286,976
1926	152,764	58,623	25,944	45,416	2,739	9,332	294,818
1927	171,280	46,369	25,341	49,928	4,595	13,617	311,138
1928	176,807	36,237	39,592	40,212	1,500	13,578	307,926
1929	187,469	47,199	45,471	39,312	7,306	7,478	334,235
1930	181,195	43,916	46,101	36,758	7,335	7,358	322,693
1931	185,037	49,063	47,155	18,011	8,922	7,923	316,111
1932	150,589	46,735	38,185	46,971	11,708	24,340	318,528
1933	194,754	65,264	32,564	56,303	22,420	29,328	400,633
1934	179,320	59,253	34,661	46,878	20,054	15,318	355,484
1935 IMPORTS IN TONS OF 2,000 LBS.							
1935	225,773	69,237	30,231	52,407	29,550	22,225	429,423

Source—Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce.

The 24 SUMNER KNOT BORERS in the New Weyerhaeuser Pulp Mill



The SUMNER Chip Screen



The SUMNER Chipper

The Weyerhaeuser Organization

AGAIN SHOWS FAITH IN THE NORTHWEST AND ITS PRODUCTS BY INSTALLING "SUMNER" STANDARD AND SPECIAL MACHINES IN THEIR NEW EVERETT PULP MILL

We Build a complete line of:

SAW MILL MACHINERY
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SCREENS
CHIP DUSTERS
CHIP BREAKERS
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SPECIAL MACHINES

●

Sumner Iron Works

Everett, Washington

UNITED STATES

Imports of Bleached and Unbleached Sulphate—1920 to 1935

By Countries of Origin

(Long Tons of 2,240 Pounds)

Countries:	Sweden	Canada	Finland	Norway	All Others	Total
1920	25,012	114,175	7,762	3,363	1,236	178,548
1921	57,702	89,729	5,799	522	2,733	159,006
1922	122,545	137,307	23,631	8,850	2,611	294,944
1923	84,739	131,304	20,089	10,258	2,728	249,118
1924	144,148	125,256	17,749	13,080	5,474	305,707
1925	159,282	127,567	21,170	10,568	4,635	323,222
1926	169,810	140,625	25,006	11,798	3,711	350,950
1927	180,897	138,660	19,602	10,690	2,102	351,951
1928	201,757	141,779	32,139	15,761	4,410	395,846
1929	227,760	116,290	31,907	17,079	6,333	399,639
1930	247,361	76,334	35,427	13,072	3,677	338,714
1931	259,238	52,700	55,692	4,385	6,183	378,198
1932	227,226	37,283	45,278	13,285	1,798	324,870
1933	375,583	54,412	49,288	16,513	2,612	498,408
1934	332,019	77,017	52,367	14,263	2,462	478,128
1935 IMPORTS IN TONS OF 2,000 LBS.						
1935	429,916	94,748	66,286	17,356	3,036	611,342

Source: Department of Commerce, Bureau of Foreign and Domestic Commerce.

UNITED STATES

Imports of Bleached Sulphate Pulp—By Countries of Origin—1930-1935

(Long Tons of 2,240 Lbs.)

	Canada	Finland	Germany	Norway	Sweden	Others	Total
1930	12,505	2,445	256	----	----	387	22,108
1931	22,940	2,263	160	28	7,851	----	33,242
1932	19,872	1,522	----	324	1,648	----	23,366
1933	24,778	2,249	----	242	9,159	----	36,428
1934	30,804	2,740	----	452	14,279	----	48,275
1935 IMPORTS IN TONS OF 2,000 LBS.							
1935	51,199	4,113	----	28	29,262	56	84,658

Source—Department of Commerce, Bureau of Foreign and Domestic Commerce.

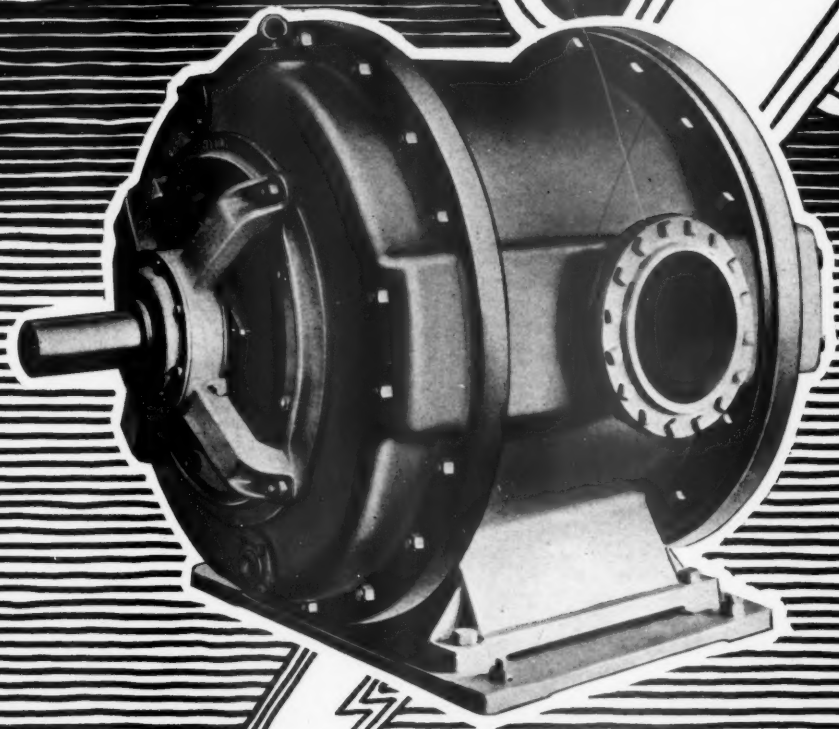
PAPER AND PULP IMPORTS OF THE UNITED STATES

For the Twelve Months Ending Dec. 31, 1935 and 1934

PAPER IMPORTS

Articles—	12 Months, Ending Dec., 1935 Quantity	12 Months, Ending Dec., 1935 Dollars	12 Months, Ending Dec., 1934 Quantity	12 Months, Ending Dec., 1934 Dollars
Paper and Manufactures	----	93,443,916	----	86,518,680
Printing paper—				
Standard news print, free 1,000 lbs.	4,766,631	82,265,267	4,419,396	76,271,527
Other,n.e.s., dut. lbs.	11,560,208	246,467	7,799,950	167,897
Grease and waterproof, dut. lbs.	594,128	122,003	346,231	78,232
Kraft wrapping, dut. lbs.	24,726,308	817,347	8,052,950	297,909
Other wrapping, dut. lbs.	1,085,986	42,557	1,602,658	59,417
Writing and drawing, dut. lbs.	1,248,949	295,604	1,635,370	359,524
Paper and envelope combinations, dut. lbs.	----	26,393	----	23,633
Surface coated, dut. lbs.	1,806,788	593,262	1,634,656	612,465
Uncoated, decorated, embossed, dut. lbs.	38,062	16,120	26,718	10,091
Tissue and similar paper:				
Not over 6 pounds to the ream, dut. lbs.	1,169,405	562,164	1,091,594	534,790
Other, dut. lbs.	589,404	235,744	507,263	224,457
Pulpboard, in rolls, dut. lbs.	16,716,211	288,227	18,184,482	317,627
Paperboard, pulpwood, n.e.s., cardboard, dut. lbs.	17,370,796	285,098	15,594,084	269,854
Leatherboard, test, and wallboard, dut. lbs.	15,199,326	457,637	7,219,306	239,952
Cigarette paper:				
Flat or in bobbins, dut. lbs.	13,150,303	3,290,784	15,774,318	4,122,578
Books and book covers, dut. lbs.	2,166,506	709,488	----	----
Hanging paper (wall paper), dut. lbs.	363,784	123,689	248,274	95,286
Duplex, decalcomania, not printed, free lbs.	460,902	98,177	441,903	94,381
Paper boxes, dut.	----	434,061	----	634,460
Papier mache and pulp manufactures, dut. lbs.	----	324,173	----	341,245
Other paper and manufactures, dut.	----	2,209,654	----	1,763,355

RIGHT TO THE POINT!



ECONOMY

NASH PUMPS

A thousand leading mills have found these pumps the answer to vacuum problems. Simple, efficient, and economical. One moving part, rotating without metallic contact. No pistons, no gears. Ball bearings. Increased vacuum range. These pumps set new standards for performance and economy. Ask for Bulletin No. 236.

THE NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

PAPER BASE STOCK IMPORTS

Articles—		12 Months, Ending Dec., 1935 Quantity	12 Months, Ending Dec., 1935 Dollars	12 Months, Ending Dec., 1934 Quantity	12 Months, Ending Dec., 1934 Dollars
Paper base stocks		.....	82,043,697	.....	71,209.410
Pulpwood	cords	1,037,332	7,760,700	971,190	7,322.856
Rough:					
Spruce, free	cords	83,054	669,417	168,974	1,232.400
Other, free	cords	16,605	88,681	15,643	85.140
Peeled:					
Spruce, free	cords	748,011	6,013,576	668,424	5,359.726
Other, free	cords	189,237	986,667	113,412	610,569
Rossed:					
Spruce, free	cords	374	2,104	4,737	35,021
Other, free	cords	51	255	.....	.....
Wood and other pulp: (Tons = 2,000 pounds, airdry weight)					
Mechanically ground wood pulp:					
Unbleached, free	tons	172,203	2,980,955	159,331	3,020,850
Bleached, free	tons	17,838	296,430	9,753	224,200
Sulphite wood pulp:					
Unbleached, free	tons	693,026	24,026,390	603,117	2,179,584
Bleached, free	tons	429,424	21,934,054	355,484	19,415,304
Sulphate, wood pulp:					
Unbleached (Kraft), free	tons	526,684	15,893,593	429,853	13,773,776
Bleached, free	tons	84,658	5,193,789	48,275	3,334,713
Soda pulp, free	tons	9,416	409,636	6,665	304,660
Other pulp, free	tons	394	26,074	137	25,182
Rags for paper stock, free	lbs.	201,310,993	2,411,424	101,523,797	1,282,668
All other paper stock, free	lbs.	77,800,892	1,110,652	52,524,939	753,617

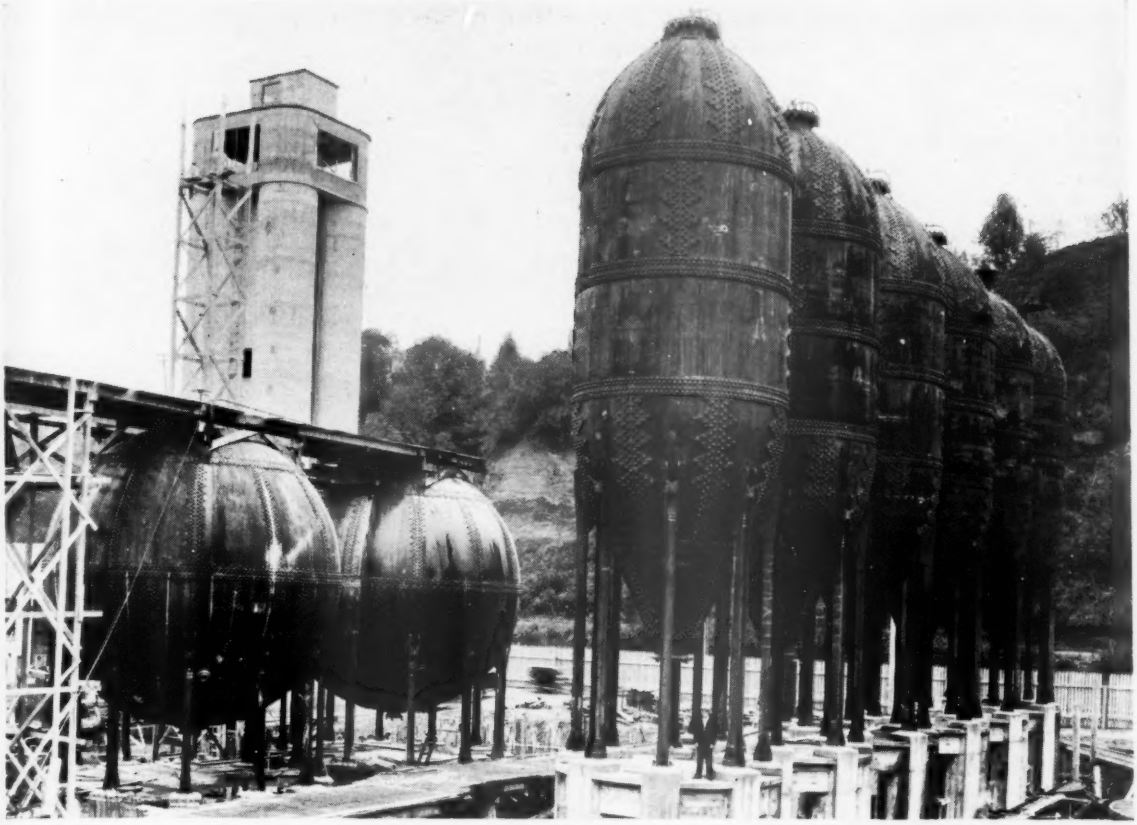
U. S. WOOD PULP IMPORTS

Quantity and Value

1922-1935

	Bleached Sulphite Long Tons	Bleached Sulphite Value	Unbleached Sulphite Long Tons	Unbleached Sulphite Value	Unbleached Sulphate Long Tons	Unbleached Sulphate Value	Bleached Sulphate Long Tons	Bleached Sulphate Value
1935	383,475	$21,934,054	618,872	$24,026,340	470,329	$15,893,593	75,600	$5,193,789
1934	355,484	19,415,304	603,117	21,791,584	429,853	13,733,776	48,275	3,334,713
1933	400,633	19,138,468	643,003	19,946,124	461,890	12,568,367	36,622	2,361,882
1932	311,046	14,727,214	508,088	17,047,669	310,659	9,818,674	23,366	1,975,720
1931	319,518	18,887,719	540,478	23,033,069	344,612	12,035,030	29,683	2,267,090
1930	322,886	22,721,929	665,049	33,193,598	357,551	16,452,381	19,533	1,468,599
1929	334,235	25,338,603	701,456	35,328,982	384,005	20,518,676	15,364	1,139,820
1928	307,771	23,268,421	640,660	32,587,134	381,256	21,170,948	14,590	894,587
1927	311,130	24,224,626	613,856	23,262,845	341,162	20,684,298	10,789	708,712
1926	294,818	23,677,929	628,923	37,032,470	334,803	21,193,459	16,147	1,048,662
1925	286,976	22,527,879	579,284	31,542,079	306,073	18,257,446	17,419	989,933
1924	272,370	21,006,429	562,020	30,092,530	277,994	15,904,350	27,613	1,549,629
1923	250,580	22,245,868	461,853	26,548,431	233,696	15,228,747	15,422	1,080,961
1922	213,093	17,996,401	422,700	22,297,283	275,504	16,085,121	19,440	1,169,570

	Total, All Chemical Pulp Long Tons	Total, All Chemical Pulp Value	Mechanical Pulp Long Tons	Mechanical Pulp Value	Total, All Grades Wood Pulp Long Tons	Total, All Grades Wood Pulp Value
1935	1,557,026	$67,403,602	169,707	$3,277,385	1,726,732	$70,680,987
1934	1,443,351	58,605,219	169,084	3,245,050	1,612,615	61,850,269
1933	1,545,994	54,184,091	187,750	3,214,919	1,733,744	57,399,010
1932	1,154,907	43,652,916	168,272	3,268,457	1,323,179	46,921,373
1931	1,237,600	56,409,638	188,086	4,498,022	1,425,686	60,907,660
1930	1,369,327	74,140,504	267,193	7,146,290	1,636,520	81,286,794
1929	1,441,110	82,840,220	244,162	6,245,776	1,785,272	89,085,996
1928	1,351,005	78,476,280	222,499	5,443,495	1,573,504	83,919,775
1927	1,280,285	80,124,449	219,285	5,961,821	1,499,570	86,086,270
1926	1,278,548	83,208,851	271,213	8,278,220	1,549,761	91,487,071
1925	1,191,875	73,469,063	295,618	8,517,116	1,487,493	81,986,179
1924	1,142,123	68,678,210	219,571	7,190,129	1,361,694	75,868,339
1923	967,869	65,495,800	267,527	9,280,863	1,235,396	74,776,663
1922	931,992	57,600,844	192,688	5,706,529	1,124,680	63,307,373



At the left are the two spherical acid accumulators installed for the CHEMIPULP SYSTEM. This photograph was taken during construction of the new 150 tons per day unbleached sulphite pulp mill of the Weyerhaeuser Timber Company at Everett, Washington.

THE IMPROVED CHEMIPULP PROCESS

The Chemipulp installation at the new Weyerhaeuser 150 tons per day unbleached sulphite pulp mill at Everett, Washington, is the 41st CHEMIPULP SYSTEM to start in operation.

Of these 41 CHEMIPULP SYSTEMS 8 represent REPEAT ORDERS.

From a business standpoint these 41 installations speak forcefully of the economies inherent in the CHEMIPULP PROCESS.

CHEMIPULP PROCESS, INC.

Woolworth Building
Watertown, N. Y.

Pacific Coast Office: 3311 First Ave., So.
Seattle, Washington

and in Canada
Chemipulp Process, Ltd., 403 Crescent Bldg., Montreal, P. Q.

PAPER AND PULP EXPORTS OF THE UNITED STATES

For the Twelve Months Ending Dec. 31, 1935 and 1934

PAPER EXPORTS

Articles—		12 Months, Ending Dec., 1935 Quantity	12 Months, Ending Dec., 1935 Dollars	12 Months, Ending Dec., 1934 Quantity	12 Months, Ending Dec., 1934 Dollars
Paper and Manufactures			20,519,550		18,877,850
Printing paper—					
Newsprint paper	lbs.	45,044,940	861,333	46,855,378	977,341
Book paper, not coated	lbs.	19,912,552	1,026,634	16,974,612	911,024
Cover paper	lbs.	1,399,500	176,904	948,388	132,887
Greaseproof and waterproof paper	lbs.	5,856,717	1,137,661	4,691,436	881,936
Overissue and old newspapers	lbs.	166,398,277	1,121,726	188,304,729	1,581,370
Wrapping paper	lbs.	39,229,055	1,882,504	46,169,444	1,957,283
Surface-coated paper	lbs.	7,959,194	843,426	7,157,076	776,134
Tissue and crepe papers	lbs.	4,754,526	588,675	4,802,569	631,536
Toilet paper	lbs.	8,283,260	657,703	7,411,241	599,605
Paper towels and napkins	lbs.	2,475,815	236,819	2,347,550	227,767
Boxboard (paper board and strawboard)	lbs.	52,681,922	1,135,396	46,886,422	952,209
Bristols and bristol board	lbs.	2,294,378	140,669	1,963,401	130,370
Other paper board	lbs.	25,400,443	1,037,199	21,112,154	800,428
Sheathing and building paper	lbs.	8,436,688	259,776	7,769,904	220,174
Fiber insulating board or bat	sq. ft.	43,885,992	1,269,005	34,039,019	981,534
Wall board of paper or pulp	sq. ft.	11,905,414	301,243	10,119,296	276,490
Blotting paper	lbs.	1,993,228	202,461	1,876,637	184,980
Filing folders, index cards and other office forms	lbs.	869,282	290,116	872,976	304,174
Papeteries (fancy writing paper)	lbs.	249,371	56,072	186,450	45,217
Other writing paper	lbs.	24,492,613	1,652,857	18,513,617	1,264,961
Paper hangings (wall paper)	lbs.	1,002,374	105,731	800,458	89,465
Paper bags	lbs.	13,682,174	753,310	13,457,080	744,289
Boxes and cartons	lbs.	10,893,574	656,864	9,763,493	633,576
Envelopes	lbs.	855,590	143,734	877,449	146,362
Vulcanized fiber sheets, strips, rods and tubes	lbs.	3,676,972	1,005,864	3,546,066	951,159
Cash-register and adding-machine paper	lbs.	3,483,319	261,954	3,196,172	246,298
Other paper and paper products			2,713,914		2,229,281

PAPER BASE STOCK EXPORTS

Article—		12 Months, Ending Dec., 1935 Quantity	12 Months, Ending Dec., 1935 Dollars	12 Months, Ending Dec., 1934 Quantity	12 Months, Ending Dec., 1934 Dollars
Paper base stocks			9,890,499		8,149,576
Pulpwoods	cords	29,267	181,807	12,104	66,458
Wood pulp—					
Sulphite wood pulp	tons	148,586	8,347,968	124,348	6,815,640
Soda wood pulp	tons	1,899	104,932	1,196	69,228
Other wood pulp	tons	2,328	180,071	2,073	120,691
Rags and other paper stock	lbs.	61,085,153	1,075,721	107,527,402	1,077,559

UNITED STATES

Paper Board—Operation, Production, Orders[1]

(.012 of an inch or more in thickness)

Year and Month—1935	—Operation—(Inch hours[1]— (Based on last dryer width) Rated Capacity	Operated	Per Cent of Capacity	—Production—(Short tons)— Rated Capacity	Output	Per Cent of Capacity	New orders (Short tons)	Unfilled orders end month (Short tons)
January	15,455,578	9,793,592	63.4	416,501	262,026	62.9	273,151	80,987
February	13,636,918	9,308,323	68.3	366,598	251,870	68.7	252,578	84,341
March	14,709,922	10,029,490	68.2	398,949	275,770	69.1	268,360	79,049
April	14,901,848	9,543,895	64.0	402,831	260,851	64.8	255,730	79,296
May	15,498,589	9,615,348	62.0	418,324	262,463	62.7	259,995	80,367
June	14,284,978	9,418,123	65.9	385,742	256,665	66.5	248,656	78,020
July	15,592,118	9,397,786	60.3	423,545	260,207	61.4	259,486	78,241
August	15,592,118	10,450,399	67.0	423,545	291,127	68.7	297,349	86,767
September	14,380,430	10,273,750	71.4	390,840	289,596	74.1	307,103	105,088
October	16,108,039	12,404,641	77.0	434,717	345,596	79.5	351,887	107,074
November	13,598,280	10,526,226	77.4	399,897	294,290	73.6	272,477	88,971
December	14,770,746	8,818,058	59.7	400,139	243,594	60.9	234,753	81,894
Total (Year 1935)	**178,529,564**	**119,579,631**	**67.0**	**4,861,628**	**3,294,055**	**67.8**	**3,281,525**	.....
Total (Year 1934)	**176,800,951**	**105,201,235**	**59.5**	**4,767,029**	**2,839,705**	**59.6**	**2,807,470**	.....
Total (Year 1933)	**165,594,126**	**105,986,270**	**64.0**	**4,619,730**	**2,912,374**	**63.0**	**2,913,370**	.....
Total (Year 1932)	**138,115,824**	**75,979,629**	**55.0**	**3,904,824**	**2,152,045**	**55.1**	**2,148,991**	.....
Total (Year 1931)	**137,218,968**	**91,894,961**	**67.0**	**3,879,836**	**2,556,851**	**65.9**	**2,527,024**	.....
Total (Year 1930)	**139,179,840**	**96,843,592**	**69.6**	**3,917,436**	**2,699,595**	**68.9**	**2,685,373**	.....

*Revised.

[1] Monthly statistics on Paperboard for December, November and October, 1935, for 93 manufacturers, with comparisons for previous months for 94 manufacturers, compiled from data furnished by the National Paperboard Association from reports of members, and by manufacturers reporting direct to the Bureau of Census, are presented in the above tables. One company, reporting prior to October, 1935, discontinued the production of paperboard. These statistics were released by Director W. L. Austin, Bureau of the Census, Department of Commerce.

Rated (24-hour) capacity data for paperboard machines in inch hours hours in this report are based on last dryer width whereas those shown in the reports for 1932 and earlier years were based on maximum trim width. The capacity data vary according to the normal number of working days in each month.

F. C. HUYCK & SONS

KENWOOD MILLS

ALBANY, N. Y.

Manufacturers
of

KENWOOD FELTS
and JACKETS *for*
ALL PULP and PAPER MAKING PURPOSES

Since 1870

KENWOOD
WOOL PRODUCTS
REG. U.S. PAT. OFF.

Agents for Pacific Coast
PACIFIC COAST SUPPLY CO.

Portland
784 Pittock Block

Seattle
715 White Bldg.

San Francisco
343 Sansome St.

SHIPMENTS, STOCKS AND PRODUCTION OF PAPERBOARD AND CONSUMPTION AND STOCKS OF WASTE PAPER (85 Selected Manufacturers)*

(Short Tons)

Year and Month—1935	Shipments of box board	Stocks of Box Board end of month	Production	Consumption of Waste Paper			Stocks of Waste Paper, End of Mo.		
				Capacity	Consumed	Per Cent of Capacity	Total	At plants	In transit and unshipped purchases
January	.....	.....	262,026	359,167	210,812	58.7	245,593	210,520	35,073
February	.....	.....	251,870	322,920	211,560	65.5	253,795	214,069	39,726
March	.....	.....	275,770	345,236	231,584	67.1	242,157	207,987	34,170
April	.....	.....	260,851	347,845	217,300	62.5	244,913	214,680	30,233
May	.....	.....	262,463	361,312	219,767	60.8	256,000	222,519	33,481
June	.....	.....	256,665	334,875	213,523	63.8	263,229	230,365	32,864
July	.....	.....	260,207	366,084	217,934	59.5	280,823	233,784	47,039
August	.....	.....	291,127	366,084	246,537	67.3	260,569	228,137	32,432
September	.....	.....	289,596	337,395	244,963	72.6	259,418	220,998	38,420
October	.....	.....	345,596	373,312	288,668	77.3	255,465	214,685	40,780
November	.....	.....	294,290	345,005	246,318	71.4	248,341	213,297	35,044
December	.....	.....	243,594	344,705	196,429	57.0	246,298	211,029	35,269
Total (Year 1935)	.....	.....	**3,294,055**	**4,203,940**	**2,745,395**	**65.3**	.....	.....	.....
Total (Year 1934)	**2,641,570**	.....	**2,642,734**	**4,189,823**	**2,393,973**	**50.2**	.....	.....	.....
Total (Year 1933)	**2,392,374**	.....	.....	**3,245,183**	**2,033,175**	**62.7**	.....	.....	.....
Total (Year 1932)	**2,160,093**	.....	.....	**3,633,531**	**2,151,194**	**59.2**	.....	.....	.....
Total (Year 1931)	**2,544,301**	.....	.....	**3,598,254**	**2,391,368**	**66.5**	.....	.....	.....
Total (Year 1930)	**2,692,498**	.....	.....	**3,789,427**	**2,572,445**	**67.9**	.....	.....	.....

* Revised. At the end of 1934 the Bureau of Census, Department of Commerce, ceased reporting shipments of paperboard and stocks of paperboard at end of month.

U. S. PAPER PRODUCTION—1933-1935*

(Tons of 2,000 lbs.)

	1933	1934	1935
Total—All Grades	**9,190,017**	**9,186,226**	**10,307,000**
Newsprint	928,332	989,705	939,000
Book papers	1,080,196	1,055,247	1,194,000
Paperboard	4,076,290	4,073,309	4,693,000
Wrapping	1,440,029	1,357,438	1,570,000
Writing	478,356	414,542	480,500
Cover	12,697	17,011	20,500
Tissue	406,760	398,770	425,000
Absorbent	79,832	78,953	85,000
Building	328,275	327,866	426,000
All Other	359,250	473,385	474,000

*Bureau of Census, U. S. Department of Commerce, Census of Manufacturers for 1933 and 1934 data. 1935 estimates by the American Paper and Pulp Association.

WOOD PULP PRICES IN U. S.

Year—	Domestic Bleached Sulphite	Foreign Bleached Sulphite	Foreign Strong Sulphite	Swedish Kraft	Domestic Bleached Soda
1928	$80	$68–$78	$48–$55	$50–$55	.....
1929	75– 80	68– 77	50– 56	47– 50	.....
1930	65– 75	57– 68	42– 56	30– 47	.....
1931	45– 65	43– 57	32– 43	28– 31	.....
1932	35– 45	35– 43	27– 32	25– 30	.....
1933	35– 60	35– 57	27– 43	25– 37	$40–$50
1934	55– 60	55–	42–	33– 38	$50
1935	50– 55	50– 55	37– 42	33– 36	$50
Monthly price movement, 1935—					
January	$55	$55	$42	$33	$50
February	55	55	42	34	50
March	55– 50	55– 50	42– 38	34	50
April	50	50	38	34	50
May	50	50	38	34	50
June	50	50	38	34	50
July	50	50	38– 37	34	50
August	50	50	37	34	50
September	50	50	37	34	50
October	50	50	37	35	50
November	50	50	37	35	50
December	50	50	37– 38	35– 36	50

UNITED STATES

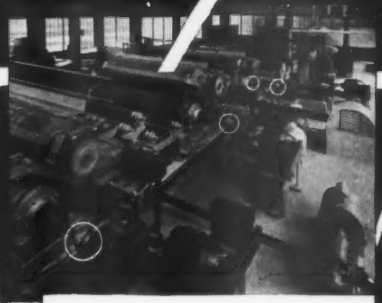
Wood Pulp Imports—Grade Totals—1899-1921

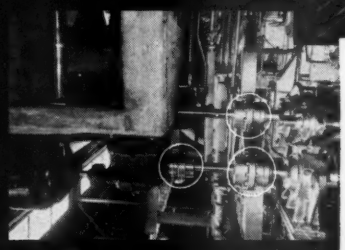
(In Tons of 2,000 Lbs.)

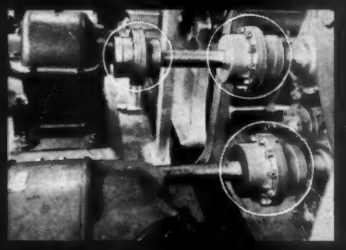
Year	Total	Groundw'd	Total Sulphite	Total Sulphate
1921	697,100	190,744	328,270	178,086
1920	906,297	233,148	473,175	199,974
1919	636,016	202,253	282,707	151,056
1918	578,209	185,478	270,211	122,520
1917	677,841	279,073	289,210	109,558
1916	683,765	262,517	.....	.....
1915	568,379	174,056	.....	.....
1914	675,564	217,256	.....	.....
1913	541,455	167,889	.....	.....
1912	539,790	185,443	.....	.....
1911	562,424	262,681	.....	.....
1910	506,776	224,184	.....	.....
1909	370,023	145,362	.....	.....
1908	250,485	71,217	.....	.....
1907	296,778	.....	.....	.....
1906	199,702	.....	.....	.....
1905	170,867	.....	.....	.....
1904	179,324	.....	.....	.....
1899	57,335	.....	.....	.....

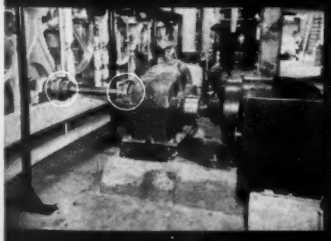
Source: U. S. Department of Commerce.

again, It's Fast's Couplings









FAST'S unequalled record for dependable performance led the Weyerhaeuser Timber Company of Everett, Washington, to specify Fast's Self-Aligning Couplings for their new unbleached sulphite pulp mill.

You, too, can prevent operating trouble by specifying *genuine* Fast's Self-Aligning Couplings on the machinery you purchase.

THE illustration above shows Fast's construction. No perishable materials are necessary to make it dust and moisture proof.

FAST'S PATENTS COVER THESE VITAL FEATURES

THE BARTLETT HAYWARD COMPANY
BALTIMORE, MARYLAND

CANADA
Wood Pulp Exports
(Tons of 2,000 lbs.)

Year—	Chemical Pulp Tons	Chemical Pulp Value	Mechanical Pulp Tons	Mechanical Pulp Value	Total, All Pulp Net Tons	Total, All Pulp Value
1935	538,419	$24,993,785	124,049	$ 2,631,945	662,468	$27,625,730
1934	486,990	22,716,942	118,645	2,727,902	605,635	25,444,844
1933	476,358	20,666,614	132,151	2,688,023	608,509	23,354,637
1932	336,063	16,367,976	116,229	2,562,080	452,292	18,930,065
1931	457,435	25,450,476	165,096	4,606,167	622,531	30,056,643
1930	551,413	33,092,807	208,759	5,967,172	760,172	39,059,979
1929	626,378	37,670,383	209,331	5,906,638	835,709	43,577,021
1928	660,136	40,068,703	203,670	5,546,120	863,806	45,614,323
1927	618,324	39,234,577	260,831	7,761,464	879,155	46,996,011
1926	621,004	40,571,304	382,077	11,505,818	1,003,081	52,077,122
1925	599,466	37,358,632	360,265	10,573,273	959,671	47,931,905
1924	528,279	32,326,943	253699	7,916,029	781,978	40,242,972
1923	.....	.....	.....	.....	875,358	37,027,496
1922	.....	.....	.....	.....	818,246	41,037,849
1921	.....	.....	.....	.....	527,222	33,133,675
1920	.....	.....	.....	.....	819,985	76,563,978
1919	.....	.....	.....	.....	709,134	37,184,764
1918	.....	.....	.....	.....	583,911	33,359,922

CANADA
PULP PRODUCTION
(Tons of 2,000 lbs.)

	Mechanical Tons	Sulphite Tons	Sulphate Tons	Total Tons
1920	1,090,114	654,273	188,487	1,922,774
1921	931,560	476,929	131,337	1,539,826
1922	1,241,185	678,878	217,862	2,137,925
1923	1,449,106	749,668	224,812	2,413,586
1924	1,427,782	768,035	218,207	2,414,024
1925	1,621,917	842,785	242,207	2,706,909
1926	1,901,268	995,203	256,074	3,152,545
1927	1,922,124	1,016,060	262,512	3,200,696
1928	2,127,699	1,117,227	256,969	3,501,895
1929	2,420,774	1,236,232	250,104	3,907,110
1930	2,283,130	1,076,804	188,253	3,548,187
1931	2,016,480	941,586	145,156	3,103,222
1932	1,696,021	941,579	144,367	2,781,967
1933	1,859,049	937,313	182,988	2,979,350
1934	2,340,441	1,020,493	205,980	3,566,914
1935	2,458,000	1,025,000	206,000	3,689,000

PACIFIC COAST STATES
and British Columbia
Paper Production
(Tons 2,000 lbs.)

State—	1931	1932	1933	1934
Washington	374,765	343,222	381,997	418,115
Oregon	200,065	182,789	197,970	220,684
California	192,273	139,297	167,033	169,709
British Columbia	244,397	228,075	260,599	294,183
Total Coast Production	1,011,500	893,383	1,007,599	1,102,691

Bureau of the Census, Dept. of Commerce.

PAPER CONSUMPTION PER CAPITA RISING IN U. S.

It is estimated that the per capita consumption of paper in the United States in 1935 was 198 pounds.

This is 22 pounds per capita less than the peak consumption in 1929, but a rise of 46 pounds per capita over the low of 154 pounds in 1932.

In the year 1810 the per capita consumption of paper in the United States was 1 pound.

SPEED
With Accuracy---

is essential to any industry that seeks to increase production and reduce waste and spoilage.

Low levels of lighting handicap the plant worker in speed, accuracy and comfort.

Let us help you analyze your lighting requirements.

Puget Sound Power & Light Company

"To Best Serve the Public Interest"

CHEMICO Spray Sulphur Burner and Furnace

were chosen for the new Weyerhaeuser Mill

THE CHEMICO Spray Burner and Furnace, standard of the sulphuric acid industry since 1927, are also ideal equipment for meeting the requirements of sulphite mills.

Here are the very good reasons:

Operating principle. **The raw sulphur is melted and the impurities are removed by settling and surface skimming. The molten sulphur is automatically maintained at the proper temperature for atomization, and is pumped by turbine-driven submerged centrifugal pump to one or more steam-jacketed burner nozzles. These spray the sulphur into a horizontal cylindrical brick-lined steel furnace, where it is burned under forced draft. As the air mixes thoroughly with the sprayed sulphur, no auxiliary combustion chamber is required. The atomization at the burner nozzle is purely mechanical, no compressed air being used.**

Simplicity. **The burners operate as simply as oil burners. Starting, after the sulphur is melted, is almost instantaneous, with quick gas formation at the desired strength. The cut-off at shut-down is equally quick, as no unconsumed sulphur remains in the furnace to be burned before the gas flow ceases.**

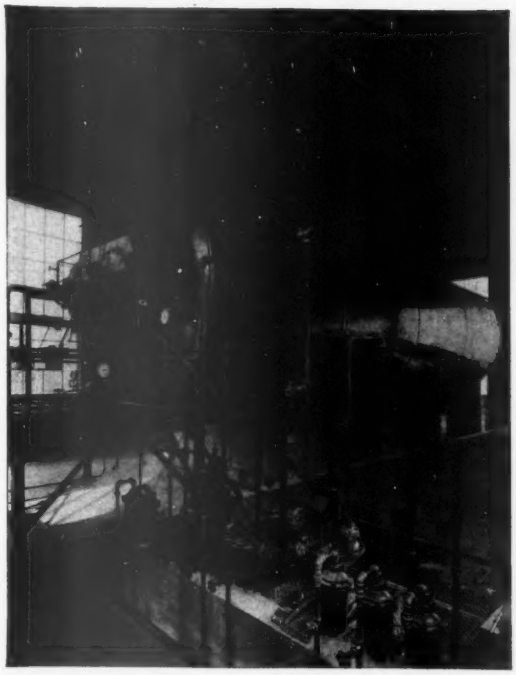
Accurate control. **After the gas volume is regulated to the consumption requirement, the gas strength is automatically maintained at any predetermined standard.**

Gas delivered at any pressure. **By using a high-pressure air blower, the SO_2 gas may be absorbed in a pressure system, to give stronger sulphite liquor.**

Compact, sturdy, long-lived equipment. **The space requirement is small. The blower, sulphur pump and turbine rotors are the only moving parts. The furnace is stationary. As the blower handles only air, anti-corrosive materials are not necessary in its construction.**

Steam Requirement. **The small quantity of steam required for melting and pumping the sulphur and operating the blower may be generated in a waste-heat boiler.**

No clogging. **The burner spray is adjusted and the nozzle orifice cleared of foreign particles without removing any burner part from the furnace and without interrupting operation.**



CHEMICO Sulphur-dioxide Producer in the new Everett, Washington, mill of the Weyerhaeuser Timber Co. Adopted for this outstanding mill after most careful consideration of all available equipment for the purpose

Minimum labor expense. **Attention consists only of periodic inspection of the control instruments, and occasional cleaning of the spray nozzles, which with handling of the sulphur take only part time of one man.**

Low cost. **The initial installation cost is reasonable and the practical absence of wear, corrosion, parts renewal and cleaning labor make the maintenance expense negligible.**

The CHEMICO Spray Sulphur Burner and Furnace are standard equipment in 23 contact sulphuric acid plants, and 4 additional plants are now being so equipped. Sizes are available for burning from 5 to 50 tons of sulphur per day. Installations are definitely guaranteed and subject to acceptance only after satisfaction is proven by test.

Tell us your needs and let us submit cost and performance data. No obligation.

Chemical Construction Corporation

Main Offices: **30 Rockefeller Plaza, New York**

Cables: Chemiconst, **New York**

CHEMICO PLANTS are PROFITABLE INVESTMENTS

Newsprint

NORTH AMERICAN PRODUCTION

Source—Newsprint Service Bureau

	Canada	United States	Newfoundland	Mexico	Total
1935—Twelve Months	2,753,000	912,000	336,000	20,000	4,021,000
1934— " "	2,599,000	957,000	316,000	20,000	3,892,000
1933— " "	2,017,004	946,374	270,834	16,367	3,250,579
1932— " "	1,914,316	1,008,588	271,804	12,683	3,207,391
1931— " "	2,221,454	1,157,436	294,983	15,195	3,689,068
1930— " "	2,504,147	1,282,372	287,259	14,286	4,088,064
1929— " "	2,728,827	1,392,276	255,501	18,680	4,395,284
1928— " "	2,381,102	1,417,572	230,745	16,981	4,046,400
1927— " "	2,086,949	1,485,495	202,852	14,137	3,789,433
1926— " "	1,881,737	1,684,218	186,471	13,412	3,765,838
1925— " "	1,522,217	1,530,318	96,588	12,681	3,161,804
1924— " "	1,352,994	1,481,425	64,648	11,500	2,910,567
1923— " "	1,266,232	1,485,000	63,906	12,000	2,827,138

NEWS PRINT PRODUCTION IN NORTH AMERICA—1923-1935

(Short Tons)

Source—News Print Service Bureau

Canadian Mills

	Production Tons
1935—Twelve Months	2,753,000
1934— " "	2,599,000
1933— " "	2,017,004
1932— " "	1,914,316
1931— " "	2,221,454
1930— " "	2,504,147
1929— " "	2,728,827
1928— " "	2,381,102
1927— " "	2,086,949
1926— " "	1,881,737
1925— " "	1,522,217
1924— " "	1,352,994
1923— " "	1,266,232

United States Mills

1935—Twelve Months	912,000
1934— " "	957,000
1933— " "	946,374
1932— " "	1,008,588
1931— " "	1,157,436
1930— " "	1,282,372
1929— " "	1,392,276
1928— " "	1,417,572
1927— " "	1,485,495
1926— " "	1,684,218
1925— " "	1,530,318
1924— " "	1,481,425
1923— " "	1,485,000

United States and Canadian Mills

1935—Twelve Months	3,665,000
1934— " "	3,556,000
1933— " "	2,963,378
1932— " "	2,922,904
1931— " "	3,378,890
1930— " "	3,786,519
1929— " "	4,121,103
1928— " "	3,798,674
1927— " "	3,572,444
1926— " "	3,565,955
1925— " "	3,052,535
1924— " "	2,834,419
1923— " "	2,751,232

NEWS PRINT IN THE UNITED STATES, 1913-1935

Compiled from Newsprint Service Bureau Data

(Tons)

Year	Production	Imports	Exports	Balance at Home
1913	1,305,000	220,000	43,000	1,482,000
1914	1,313,000	315,000	61,000	1,567,000
1915	1,239,000	368,000	55,000	1,552,000
1916	1,315,000	468,000	76,000	1,707,000
1917	1,359,000	559,000	94,000	1,824,000
1918	1,260,000	596,000	97,000	1,759,000
1919	1,375,000	628,000	111,000	1,895,000
1920	1,512,000	730,000	49,000	2,193,000
1921	1,225,000	792,000	17,000	2,000,000
1922	1,448,000	1,029,000	26,000	2,451,000
1923	1,485,000	1,309,000	16,000	2,778,000
1924	1,481,000	1,357,000	17,000	2,821,000
1925	1,530,000	1,448,000	23,000	2,955,000
1926	1,684,000	1,851,000	19,000	3,517,000
1927	1,486,000	1,984,000	12,000	3,461,000
1928	1,418,000	2,157,000	11,000	3,564,000
1929	1,392,000	2,421,000	19,000	3,796,000
1930	1,282,000	2,280,000	10,000	3,551,000
1931	1,157,000	2,067,000	10,000	3,212,000
1932	1,009,000	1,791,000	8,000	2,792,000
1933	946,000	1,793,000	11,000	2,728,000
1934	957,000	2,210,000	23,000	3,144,000
1935	912,000	2,383,000	23,000	3,272,000

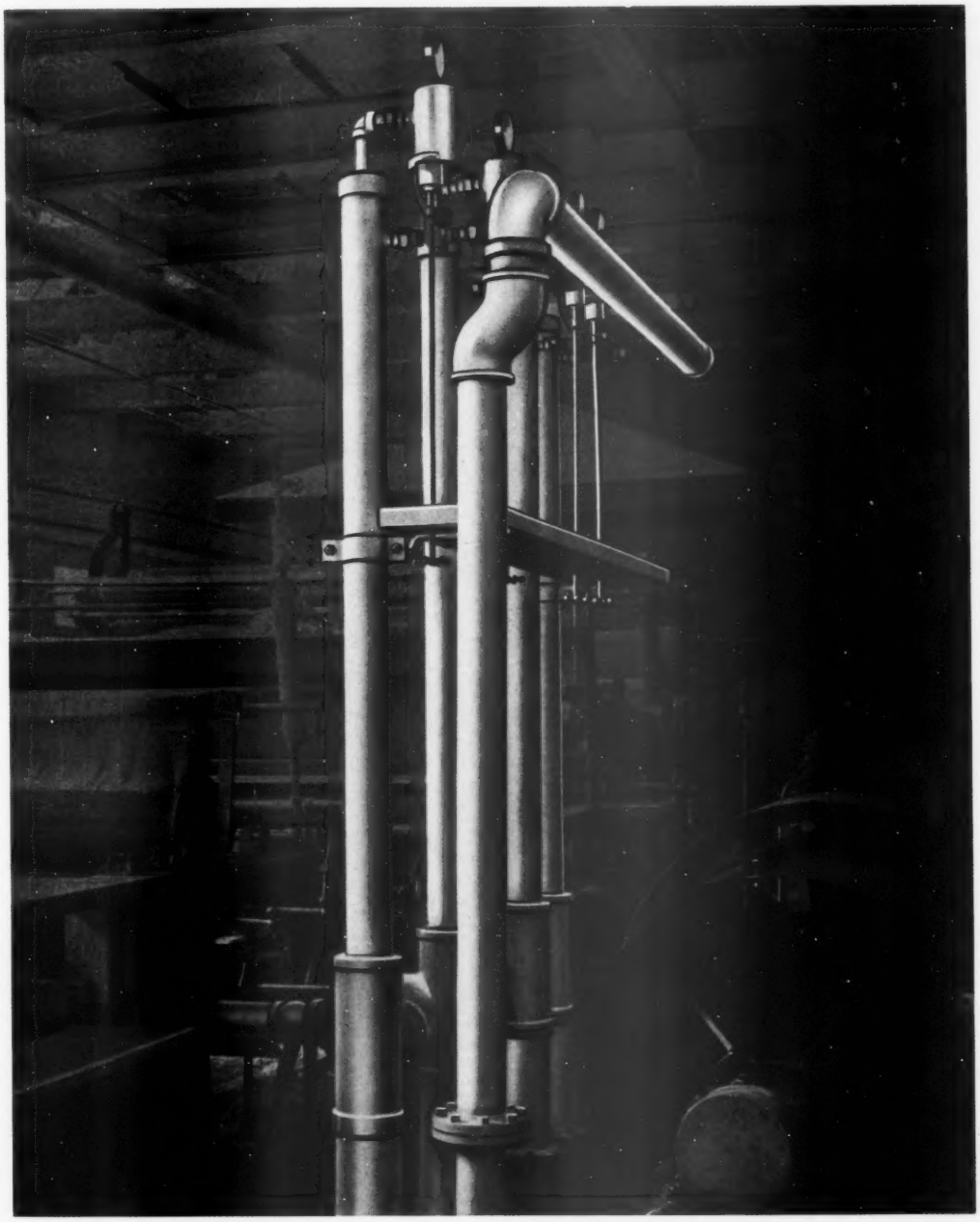
EXPORTS OF NEWS PRINT FROM UNITED STATES

(Tons)

Source—Newsprint Service Bureau

Country—	1933	1934	1935
Europe	504	404	159
Canada	10	6	9
Central America	804	1,345	800
Mexico	.....	46	3,607
Cuba	2,090	2,735	3,781
South America	1,220	1,400	1,755
China and Japan	4,540	14,273	10,610
Philippine Islands	1,770	2,905	1,459
Other Countries	235	306	302
Total	11,173	23,420	22,582

The Broughton Unit Vacuum Control System



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One of their many installations

Patented U. S. June 12, 1934—No. 1,962,477; Patented Canada March 5, 1935—No. 348-550
Many other foreign patents applied for.

150 successful installations controlling flat box vacuums now operating within United States and Canada

WEST COAST AGENT: F. H. Godfrey
Smith Tower, Seattle, Washington

A. E. BROUGHTON & COMPANY • Glens Falls, New York

WORLD PRODUCTION OF NEWSPRINT PAPER—1927 TO 1935*

(Short tons of 2,000 lbs.)

Countries—	1927 Tons	1928 Tons	1929 Tons	1930 Tons	1931 Tons	1932 Tons	1933 Tons	1934 Tons	1935 Tons	9 Year Average
Canada	2,087,000	2,381,000	2,729,000	2,504,000	2,221,000	1,914,000	2,017,000	2,599,000	2,753,000	2,356,000
United States	1,486,000	1,418,000	1,392,000	1,282,000	1,157,000	1,009,000	946,000	957,000	912,000	1,173,000
Great Britain	615,000	646,000	637,000	608,000	719,000	790,000	830,000	940,000	970,000	751,000
Germany	565,000	600,000	623,000	590,000	540,000	450,000	412,000	446,000	464,000	521,000
Newfoundland	203,000	231,000	256,000	287,000	295,000	272,000	271,000	316,000	336,000	274,000
Sweden	239,000	234,000	275,000	240,000	265,000	257,000	266,000	272,000	298,000	261,000
Japan	246,000	267,000	286,000	285,000	258,000	272,000	304,000	344,000	368,000	292,000
France	121,000	136,000	210,000	240,000	243,000	275,000	335,000	353,000	358,000	252,000
Finland	200,000	214,000	217,000	223,000	241,000	254,000	285,000	316,000	329,000	253,000
Norway	192,000	198,000	189,000	202,000	104,000	200,000	167,000	155,000	182,000	177,000
Russia	10,000(?)	7,000(?)	48,000(?)	90,000(?)	100,000(?)	125,000	135,000(?)	190,000	193,000	100,000(?)
Netherlands	77,000	76,000	77,000	84,000	79,000	85,000	87,000	92,000	92,000	83,000
Italy	42,000	45,000	52,000	69,000	69,000	74,000	72,000	68,000	76,000	63,000
Austria	50,000	57,000	62,000	64,000	62,000	53,000	50,000	50,000	50,000	55,000
Spain	25,000	26,000	30,000	32,000	62,000	65,000	65,000	42,000	42,000	43,000
Switzerland	40,000(?)	40,000	48,000	47,000	49,000	45,000	45,000	39,000	45,000	44,000
Belgium	50,000	50,000	57,000	50,000	44,000	40,000	40,000	51,000	48,000	48,000
Czechoslovakia	45,000	45,000	47,000	44,000	42,000	40,000	38,000	37,000	41,000	42,000
Poland	17,000	20,000	23,000	27,000	27,000	23,000	23,000	32,000	34,000	25,000
Estonia	21,000	20,000	27,000	29,000	17,000	6,000	6,000	6,000	4,000	15,000
Mexico	14,000	17,000	19,000	14,000	15,000	13,000	16,000	20,000	20,000	16,000
Denmark	16,000	16,000	11,000	10,000	10,000	9,000	7,000	6,000	1,000	10,000
Latvia	3,000	3,000	4,000	4,000	3,000	5,000	5,000	5,000	6,000	4,000
Chile	.....	.....	.....	.....	.....	.....	.....	6,000	6,000	1,000
Total	6,364,000	6,747,000	7,319,000	7,025,000	6,622,000	6,276,000	6,421,000	7,342,000	7,628,000	6,859,000

(?) Figures incomplete.

* Compiled by the Newsprint Service Bureau.

UNITED STATES

Newsprint Imports—1933-1935

(Tons of 2,000 lbs.)

From—	1933	1934	1935
Finland	56,577	56,813	73,928
Germany	12,058	5,740	7,156
Norway	16,591	16,417	22,571
Sweden	68,062	68,090	93,428
Canada	1,545,293	1,958,945	2,062,000
Newfoundland	95,000	107,000	124,000
Other	15	.....	2
Total	1,793,581	2,213,005	2,383,085

NEWS PRINT IN CANADA, 1913-1935

Source—Newsprint Service Bureau

(Tons)

Year	Production	Exports	Balance at Home
1913	350,000	*	*
1914	415,000	*	*
1915	489,000	*	*
1916	608,000	*	*
1917	686,000	*	*
1918	735,000	*	*
1919	803,000	708,000	95,000
1920	876,000	762,000	114,000
1921	808,000	709,000	99,000
1922	1,082,000	960,000	122,000
1923	1,266,000	1,138,000	128,000
1924	1,353,000	1,219,000	134,000
1925	1,522,000	1,402,000	120,000
1926	1,882,000	1,732,000	150,000
1927	2,087,000	1,882,000	205,000
1928	2,381,000	2,207,000	174,000
1929	2,729,000	2,511,000	218,000
1930	2,504,000	2,331,000	173,000
1931	2,221,000	2,008,000	213,000
1932	1,914,000	1,777,000	137,000
1933	2,017,000	1,838,106	179,000
1934	2,599,000	2,400,000	199,000
1935	2,753,000	2,575,000	178,000

*No data.

IMPORTS OF EUROPEAN NEWS PRINT INTO THE U. S.*

January 1, 1920—December 31, 1935 (Tons of 2,000 lbs.)

	Sweden	Germany	Finland	Norway	Other	Total
1920	18,875	21,066	3,244	5,916	1,337	50,438
1921	48,932	38,938	22,661	20,193	4,613	135,337
1922	51,812	32,838	26,205	17,292	4,741	132,888
1923	64,570	52,290	41,782	33,829	7,798	200,269
1924	60,827	38,840	35,639	17,259	3,238	155,803
1925	65,518	25,862	21,683	17,030	2,421	132,514
1926	46,020	12,884	34,292	6,176	554	99,926
1927	66,920	7,096	29,330	16,796	1,919	122,061
1928	55,718	9,170	40,237	10,864	418	116,407
1929	50,717	9,741	32,293	3,498	124	96,373
1930	69,268	13,788	41,913	9,326	.....	134,295
1931	66,688	21,910	47,992	14,444	35	151,069
1932	61,079	14,323	46,633	22,692	194	144,921
1933	68,062	12,058	56,577	16,591	15	153,303
1934	68,090	5,740	56,813	16,417	....	147,060
1935	93,428	7,156	73,928	22,571	2	197,085
Total 16 years	956,524	323,700	611,222	250,894	27,409	2,169,749
Percent	44.1	14.9	28.2	11.6	1.2	100.0

* Source—Newsprint Service Bureau.

NEWSPRINT EXPORTS FROM CANADA*

TO:	1933 Tons	1934 Tons	1935 Tons
United Kingdom	107,041	79,087	115,290
South America	50,061	114,972	112,967
South Africa	6,874	10,443	14,064
Australia	57,561	99,567	108,365
New Zealand	16,758	25,857	32,463
U. S. A.	1,519,680	1,958,945	2,051,937
Japan	32,180	57,615	66,554
China	.....	34,427	41,171
All other	47,951	18,711	32,176
Total	1,838,106	2,399,624	2,574,987

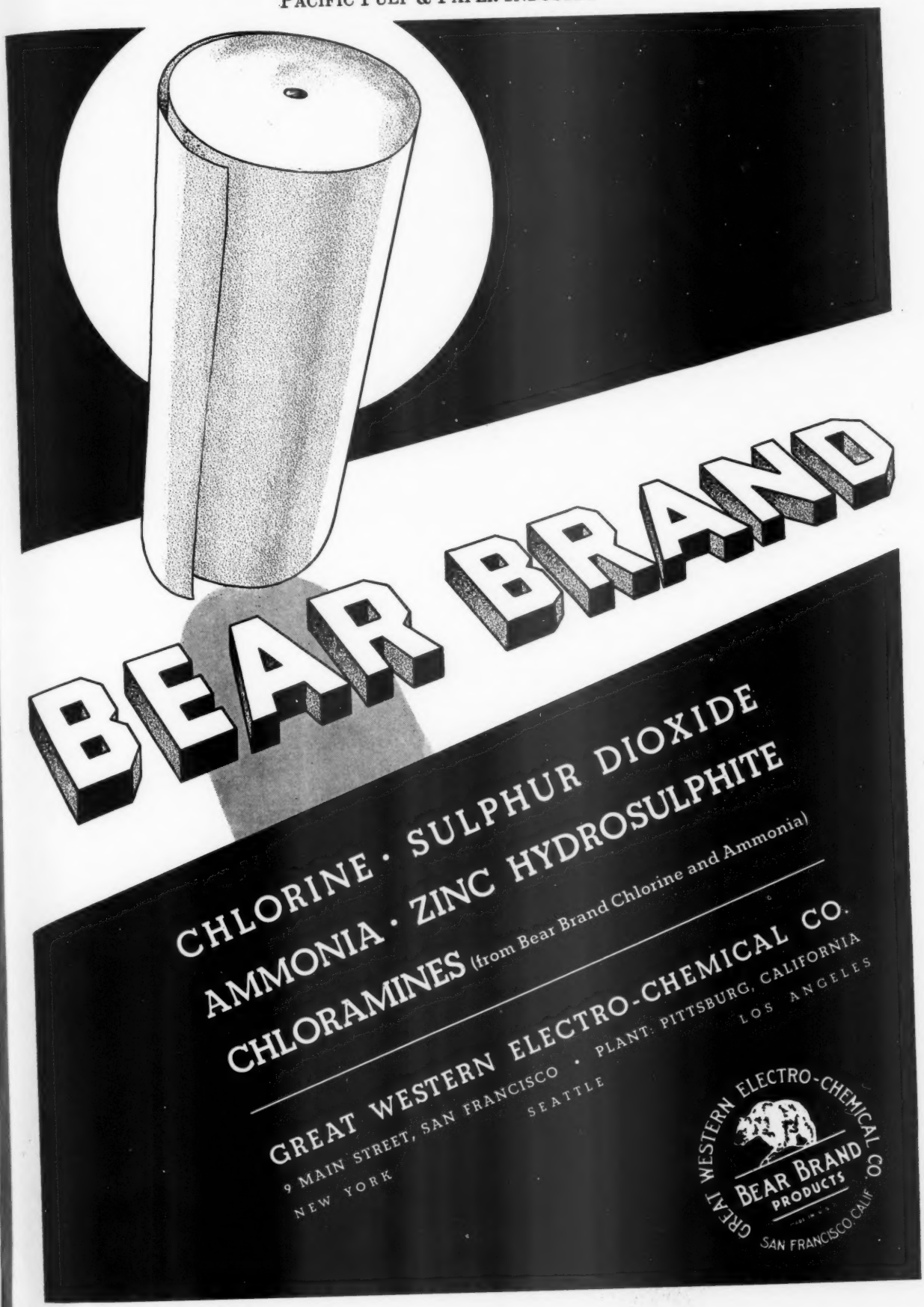
? *Compiled from Canadian Pulp & Paper Association, government reports, and News Print Service Bureau data.

BRITISH COLUMBIA

Principal Production Statistics

1934

		Quantity	Value
Pulpwood produced	cords	447,655	$2,764,498
Pulpwood consumed	cords	428,287	2,683,707
Wood pulp produced	tons	383,818	6,712,981
Wood pulp consumed	tons	314,190	4,123,199
Paper produced	tons	299,502	10,325,544


BEAR BRAND
CHLORINE · SULPHUR DIOXIDE
AMMONIA · ZINC HYDROSULPHITE
CHLORAMINES (from Bear Brand Chlorine and Ammonia)
GREAT WESTERN ELECTRO-CHEMICAL CO.
9 MAIN STREET, SAN FRANCISCO · PLANT: PITTSBURG, CALIFORNIA
NEW YORK
SEATTLE
LOS ANGELES
GREAT WESTERN ELECTRO-CHEMICAL CO
BEAR BRAND PRODUCTS
SAN FRANCISCO, CALIF.

SOURCES OF NEWS PRINT USED IN THE UNITED STATES

(Tons in Round Numbers)

Source: News Print Service Bureau

	U. S. Production	U. S. Exports	Imports into the U. S. From			Available for Consumption
			Canada	Newfoundland	Europe	
1913	1,305,000	43,000	219,000	----------	1,000	1,482,000
1914	1,313,000	61,000	310,000	----------	5,000	1,567,000
1915	1,239,000	55,000	367,000	----------	1,000	1,552,000
1916	1,315,000	76,000	468,000	----------	----------	1,707,000
1917	1,359,000	94,000	558,000	----------	1,000	1,824,000
1918	1,260,000	97,000	596,000	----------	----------	1,759,000
1919	1,375,000	111,000	628,000	----------	3,000	1,895,000
1920	1,512,000	49,000	679,000	1,000	50,000	2,193,000
1921	1,225,000	17,000	657,000	----------	135,000	2,000,000
1922	1,448,000	26,000	896,000	----------	133,000	2,451,000
1923	1,485,000	16,000	1,109,000	----------	200,000	2,778,000
1924	1,481,000	17,000	1,197,000	4,000	156,000	2,821,000
1925	1,530,000	23,000	1,295,000	20,000	133,000	2,955,000
1926	1,684,000	19,000	1,658,000	94,000	100,000	3,517,000
1927	1,486,000	12,000	1,776,000	89,000	122,000	3,461,000
1928	1,418,000	11,000	1,926,000	114,000	116,000	3,563,000
1929	1,392,000	19,000	2,195,000	132,000	96,000	3,796,000
1930	1,282,000	10,000	1,989,000	156,000	134,000	3,551,000
1931	1,157,000	10,000	1,754,000	160,000	151,000	3,212,000
1932	1,009,000	8,000	1,533,000	114,000	144,000	2,793,000
1933	946,000	11,000	1,545,000	95,000	153,000	2,728,000
1934	961,000	23,000	1,956,000	107,000	147,000	3,148,000
1935	912,000	23,000	2,062,000	124,000	197,000	3,272,000

IMPORTS OF NEWS PRINT PAPER INTO THE UNITED STATES, 1935*

Imports of news print paper into continental United States in 1935 were 171,000 tons, or 8 per cent greater than in the preceding year. The table below, worked up from monthly reports of the department of Commerce, lists—in 2,000-lb. tons—the imports by customs districts and countries of origin, each ranked in the order of importance. There are not included in the table importations from Canada of 21 tons into Alaska, 2,667 tons into Puerto Rico and 2,251 tons into Hawaii.

COUNTRIES OF ORIGIN

Customs Districts.	Canada	Newfoundland	Sweden	Finland	Norway	Germany	Total
Michigan	501,559	----------	----------	----------	----------	----------	501,559
St. Lawrence	345,571	----------	----------	----------	----------	----------	345,571
Buffalo	275,089	----------	----------	----------	----------	----------	275,089
New York	176,484	22,330	9,224	26,361	4,527	6,619	245,545
Chicago	154,775	----------	----------	----------	99	----------	154,874
Vermont	138,294	----------	----------	----------	----------	----------	138,294
Duluth and Superior	117,882	----------	----------	----------	----------	----------	117,882
Dakota	84,794	----------	----------	----------	----------	----------	84,794
Washington	56,770	----------	62	----------	----------	----------	56,832
Ohio	40,275	----------	26	----------	----------	----------	40,301
Galveston	34,635	3,537	106	126	4,863	----------	43,267
Maryland	32,771	----------	6,638	5,379	483	----------	45,271
Philadelphia	23,030	----------	10,189	7,588	1,883	----------	42,690
Virginia	17,576	21,684	6	3,709	340	----------	43,315
Florida	11,674	19,607	133	4,396	238	----------	36,048
San Francisco	11,603	----------	27,253	7,992	1,877	11	48,736
Mobile	9,302	4,832	----------	2,453	319	24	16,930
Massachusetts	8,808	19,972	939	2,290	18	----------	32,027
Wisconsin	6,144	----------	----------	----------	----------	----------	6,144
Los Angeles	5,114	4,410	18,949	6,463	5,291	----------	40,227
Rochester	3,308	----------	----------	----------	----------	----------	3,308
San Diego	894	----------	3,982	----------	----------	----------	4,876
San Antonio	312	----------	----------	----------	----------	----------	312
Maine and New Hampshire	289	----------	----------	----------	----------	----------	289
New Orleans	----------	25,363	5,582	5,402	2,563	----------	38,910
Sabine	----------	2,601	----------	----------	----------	----------	2,601
Georgia	----------	----------	10,339	775	70	502	11,686
South Carolina	----------	----------	----------	946	----------	----------	946
Connecticut	----------	----------	----------	48	----------	----------	48
Total	2,056,953	124,336	93,428	73,928	22,571	7,156	2,378,372

Canada supplied 87 per cent of the news print imported into the United States last year, European countries 8 per cent and Newfoundland 5 per cent. Imports from Canada in 1935 were 103,000 tons greater than in 1934, imports from Europe were 51,000 tons more than in the preceding year, while imports fom Newfoundland were approximately 17,000 tons more.

Some 83 per cent of the Canadian news print imported into the United States came through the seven customs districts of Michigan, St. Lawrence, Buffalo, Chicago, New York, Vermont and Duluth and Superior. News print from Newfoundland went chiefly to Atlantic and Gulf coast ports, but there was also a total of a little more than 4,000 tons to the Pacific Coast. The overseas news print was widely distributed, with approximately 68,000 tons going to the Pacific Coast, chiefly San Francisco and Los Angeles. The only substantial movement of German news print to the United States was to the port of New York.

*Source, News Print Service Bureau.

Month In, Month Out

year upon year, the uniformity of Everett papers is the hallmark of the brand. Uniformity won for Everett its present rank in the appraisement of Western publishers, printers and advertising men.

Month in, month out, unswerving adherence to manufacturing standards, and alert attention to every step of every mill run, enable Everett to pledge the continuation of its rigid policy of uniform-quality maintenance.

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Zellerbach Paper Company

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Blake, Moffitt & Towne
General Paper Company
Sierra Paper Company
Zellerbach Paper Company

OAKLAND
Blake, Moffitt & Towne
Union Paper Company
Zellerbach Paper Company

EUREKA
Humboldt Paper Company

SACRAMENTO
Blake, Moffitt & Towne
Zellerbach Paper Company

FRESNO
Blake, Moffitt & Towne
Zellerbach Paper Company

SAN JOSE
Blake, Moffitt & Towne
Zellerbach Paper Company

LONG BEACH
Sierra Paper Company

STOCKTON
Blake, Moffitt & Towne
Zellerbach Paper Company

SAN DIEGO
Blake, Moffitt & Towne
Zellerbach Paper Company

PHOENIX
Blake, Moffitt & Towne
Zellerbach Paper Company

TUCSON
Blake, Moffitt & Towne

EUGENE
Zellerbach Paper Company

PORTLAND
Blake, Moffitt & Towne
Zellerbach Paper Company

SALEM
Blake, Moffitt & Towne

SEATTLE
Blake, Moffitt & Towne
Zellerbach Paper Company

TACOMA
Standard Paper Company
Tacoma Paper and Stationery Company

SPOKANE
E. G. Ewing Paper Company
John W. Graham & Company
Spokane Paper & Stationery Company
Zellerbach Paper Company

YAKIMA
Zellerbach Paper Company

SALT LAKE CITY
Zellerbach Paper Company

BOISE
Blake, Moffitt & Towne

DENVER
The Carter, Rice & Carpenter Paper Company

HONOLULU, T. H.
Honolulu Paper Co., Ltd.
Patten Company, Ltd.

MANILA, P. I.
J. P. Heilbronn Company

AUCKLAND, N.Z.
Brown & Stewart, Ltd.

SYDNEY, AUSTRALIA
Costello & Co., Ltd.

BRITISH COLUMBIA

Review of Pulp and Paper Production

1919-1935

	—PULP—		Tons	—PAPER—	
	Sulphite	Sulphate	Groundwd	News Print	Other
1935	.....	.....	.....	262,123	33,287
1934	130,176	15,630	209,359	267,406	26,777
1933	122,265	15,715	185,451	237,107	23,492
1932	85,419	10,889	161,502	205,050	24,051
1931	124,521	11,744	170,432	217,562	17,709
1930	130,462	13,055	172,539	224,928	20,446
1929	112,925	15,647	151,066	201,009	19,492
1928	120,413	15,050	170,005	225,477	15,960
1927	119,005	13,700	163,548	214,010	13,745
1926	108,381	15,000	136,123	176,924	10,389
1925	92,514	16,856	121,363	148,201	9,261
1924	89,839	14,403	112,001	136,281	9,653
1923	99,878	9,932	107,266	142,928	7,709
1922	86,894	9,674	100,759	124,639	7,945
1921	68,502	6,519	89,725	110,176	6,934
1920	92,299	16,380	108,655	136,832	9,792
1919	80,347	9,473	99,769	123,607	7,202

	Total Production All Grades—Tons		Estimated value
	Pulp	Paper	of production:
1935	361,800	295,410	$12,414,000
1934	383,818	294,183	12,373,000
1933	323,431	260,599	10,852,000
1932	259,586	228,075	11,156,000
1931	310,029	244,397	13,508,000
1930	316,056	245,374	16,520,000
1929	279,638	220,501	14,400,000
1928	305,468	241,437	16,755,000
1927	296,253	227,755	18,505,000
1926	259,504	187,313	16,315,000
1925	230,733	157,462	14,466,000
1924	216,243	145,934	13,938,000
1923	217,076	150,637	15,018,000
1922	197,327	132,584	12,590,000
1921	164,746	117,110	13,500,000
1920	217,334	146,624	.....
1919	189,589	130,809	.....

Source—British Columbia, Department of Lands, Report of the Forest Branch.

BRITISH COLUMBIA

Wood Used in the Manufacture of Pulp

By Kinds and Processes—1934

		Average	Quantity Wood Used In Each Process	
	Quantity	Value per cord	Mechanical	Sulphite	Sulphate or Kraft
Kind of Wood—	Cords	Dollars	Cords	Cords	Cords
Spruce & Balsam	176,969	$6.96	139,023	28,385	9,561
Hemlock	243,392	5.75	42,608	192,444	8,340
Other Woods	7,926	5.79	53	1,310	6,563
Total	428,287	$6.17	181,684	222,139	24,464
Totals, 1933	375,450	$6.31	156,281	193,838	25,329
Totals, 1932	304,185	$7.97	144,148	140,364	19,673
Totals, 1931	363,688	$8.04	144,712	200,859	18,117
Totals, 1930	373,397	$8.68	142,934	211,106	19,357

Source: Canadian Department of Trade and Commerce, Dominion Bureau of Statistics, Forest Products Branch.

BRITISH COLUMBIA

Principal Statistics of the Pulp and Paper Industry

1933-1934

		1933	1934
Capital employed		$50,838,480	$50,142,875
Total number of employes	No.	2,417	2,566
Salaries and wages	$	2,958,363	$ 3,538,509
Fuel and electricity used	$	811,069	$ 836,974
Power employed	H.P.	133,048	132,957
Pulp-making materials	$	2,981,968	$ 3,375,993
Pulp manufactured	$	5,432,005	$ 6,712,981
Paper-making materials	$	3,718,374	$ 4,416,626
Paper manufactured	$	8,885,395	$10,325,544
Gross value of production	$	11,098,400	$13,278,736
Net value of production	$	7,616,175	$ 8,516,558

Source: Canadian Department of Trade and Commerce, Dominion Bureau of Statistics, Forest Products Branch.

BRITISH COLUMBIA

Pulp and Paper Exports

From All British Columbia Ports

(Compiled by Vancouver Merchants' Exchange—Short Tons)

Destination—	1927	1928	1929	1930	1931	1932	1933	1934	1935
Australia	18,226	14,550	21,480	15,940	11,835	15,314	14,685	26,053	26,026
Argentine	.....	34,045	.....	609	.....*	19,752	28,604	3,985	.....
Central and South America	.....	1,667	14,677	16,503	22,637	6,404	12,693	7,314	2,867
Canada (Eastern ports)	.....	.....	2,130	4,339	4,457	3,820	4,620	24,800	27,677
China	80	35	1,870	2,620	489	16,105	26,494	40,062	3,281
Japan	53,244	57,230	45,526	54,865	78,631	59,959	100,257	93,212	155,530
New Zealand	8,702	20,548	9,525	9,214	5,363	4,251	4,254	2,845	3,206
United Kingdom	.....	.....	1,728	621	9,047	486	347	6,953	4,164
United States	152,002	172,017	156,788	174,017	157,943	130,771	117,733	128,224	123,343
Other Countries	1,980	1,119	277	90	458	731	4,984	11,611	4,989
Total Short Tons	243,671	301,211	254,001	278,818	290,860	257,724†	314,671	345,059	351,083

*Argentine shipments in 1931 and 1935 are included under Central and South America.
†Includes 131 tons of paper shipped from New Westminster, destination not available.

FIVE LEADING COMMODITIES EXPORTED FROM CANADA

1933, 1934 AND 1935

(Fiscal Years ending March 31st)

Rank						
1933	1934	1935	Commodities	1933	1934	1935
1	1	1	Wheat	$130,546,365	$118,969,445	$132,441,685
2	2	2	Newsprint paper	74,136,863	73,238,482	82,147,844
12	3	3	Nickel	7,464,500	28,198,238	28,422,859
3	4	4	Wood-pulp	17,786,135	25,102,381	25,869,296
6	5	5	Planks and boards	11,098,960	21,258,286	24,900,902

Dominion Bureau of Statistics, Census of Industry, Forestry Branch.

General Aniline Works, Inc.
Albany Division

General Aniline Works, Inc.
Linden Division

Fastusol Blue F3RD Conc.

Fastusol Pink BBA

Dyestuffs particularly well adapted for producing

Bright, white tints on carbonate filled papers.

May be used with, or without, the addition of size or alum.

Light fastness: Very good.

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Sole Agents for GENERAL ANILINE WORKS, INC.

WORLD PULP STATISTICS
BY COUNTRIES
Production — Consumption — Imports — Exports

Statistics for 1935 were obtained by PACIFIC PULP & PAPER INDUSTRY from official sources. Statistics for years prior to 1935 were collected by the United States Pulp Producers Association from official sources for the Association's "World Wood Pulp Statistics," and are printed here with acknowledgement.

ARGENTINE REPUBLIC

Production

"Argentina produces no wood pulp. Some newsprint was produced during the war but was later discontinued. * * * A factory for converting wheat and flax straw into cellulose was completed in 1931. During the first 18 months of operation the factory produced 3,817,875 kilos (or 4,208 short tons) of cellulose and 5,699,481 kilos (6,282 short tons) of paper. * * * Although Argentina has rather a large forest wealth, most of the timber of a marketable value is found in parts of the country distant from the consuming centers, and, in general, it is cheaper to import lumber than to cut it in the timber regions and transport it to the principal markets." From "Manufacturing Developments in Argentina" by George Wythe, Chief, Latin American Section, U. S. Department of Commerce.

Imports of Wood Pulp

	Tons	Imports From	In 1933
1925	19,123	Germany	14,038
1926	15,388	Sweden	9,227
1927	22,504	Finland	7,601
1928	24,116	Lithuania	4,104
1929	33,836	Norway	1,624
1930	29,020	Canada	1,538
1931	26,324	Poland	353
1932	27,763	U. S. A.	205
1933	38,856	Austria	122
		Netherlands	44

Source: Argentine Republic, Estadistica, Direccion General, Annual of Foreign Commerce.

AUSTRALIA

Production

According to official government sources, there is no wood pulp manufactured commercially in Australia at present. However, "the Tasmanian Government very recently approved an act which makes it feasible to develop a pulp and paper industry in Australia. Under the provisions of this act, the Derwent Valley Paper Company, Ltd., plans to proceed, as promptly as is consistent with careful design, with the construction of its projected pulp and paper mill, utilizing Eucalyptus as raw material. The plant to be erected at Hobart, Tasmania, will have a capacity of upwards of 100,000 tons annually." From Pacific Pulp and Paper Industry, October, 1935.

Imports of Wood Pulp

June 30-June 30	Tons	Value in Pounds
1924-1925	13,728	180,383
1925-1926	17,376	227,122
1926-1927	12,622	170,927
1927-1928	27,259	308,259
1928-1929	13,402	151,838
1929-1930	26,554	269,270
1930-1931	25,006	218,749
1931-1932	28,877	190,834
1932-1933	38,194	246,295

Source: Australia, Commonwealth Bureau of Census and Statistics.

Paper and Board Production—1935 production of paper and board totalled 100,000 tons.

AUSTRIA

(Production (Short Tons)

	Sulphite		Sulphate	Total Chemical	Mechanical	Total
	Bleached	Unbleached				
1925	68,662	109,142	15,949	193,753	98,266	292,019
1926	70,757	114,800	15,927	201,484	105,833	307,317
1927	77,552	118,495	16,402	212,449	104,057	316,506
1928	85,427	124,827	18,078	228,332	114,859	343,191
1929	84,534	141,901	21,153	247,588	114,871	362,459
1930	218,983		16,314	235,297	114,055	349,352
1931	221,706		15,928	237,634	105,909	343,543
1932	204,631		15,432	220,063	91,943	312,006
1933	224,362		20,338	244,700	96,815	341,515
1934	108,367	136,002	18,552	262,921	88,239	351,160
1935	115,508	144,928	24,024	284,460	90,966	385,426

Source: Austria, Statistiches Handbuch, Statistiches Department. 1934, United States Department of Commerce, Consular Report.

Consumption of Raw Materials

"The Austrian paper industry consumes practically only Austrian raw material (1,300,000 cubic metres of pulpwood, 500,000 tons of brown coal, 30,000 tons of china clay, 4,000 tons of resin, etc.) It is, therefore, one of the most important industries in the country." Dr. Hans Charbula in **World's Paper Trade Review**, August 9, 1935."

AUSTRIA

Exports (By Quantity)

	Mechanical	Bleached Cellulose	Unbleached Cellulose	Total Cellulose	Total
1920	22,682			4,094	26,776
1925	30,012			94,811	124,823
1926	29,871			98,345	128,216
1927	28,272			94,735	123,007
1928	28,879			103,875	132,754
1929	21,312			102,726	124,038
1930	17,100	43,000	68,721	111,721	128,821
1931	17,427	49,435	66,585	116,020	133,447
1932	11,924	42,064	58,123	100,187	112,111
1933	12,987	58,180	60,649	118,829	131,816
1934	14,717	60,411	70,425	130,836	145,553

Source: Austria, Statistisches Department, Statistik des Auswartigen Handels.

Exports (By Countries)

	Mechanical	Bleached Cellulose	Unbleached Cellulose	Total Cellulose	Total
Italy	5,295	27,628	45,509	73,137	78,432
Hungary	3,189	7,144	16,892	24,036	27,225
France	803	13,516	.....	13,516	14,319
Germany	721	4,812	2,680	7,492	8,213
Yugoslavia	849	1,946	3,491	5,437	6,286
Bulgaria	504	1,559	550	2,109	2,613
Greece	1,488	667	278	945	2,433
Switzerland	46	875	618	1,493	1,539
Japan	.....	1,486	.....	1,486	1,486
Rumania	1,124	.....	333	333	1,457
China	114	375	.....	375	489
United States	.....	387	.....	387	387
Czechoslovakia	234	.....	75	75	309
Poland	277	.....	.....	.....	277

Source: Austria, Statistisches Department, Statistik des Auswartigen Handels.

Imports (Short Tons)

	Mechanical	Bleached Cellulose	Unbleached Cellulose	Total Cellulose	Total
1925	.....			11,382	11,382
1926	18			10,246	10,246
1927	.....			7,033	7,051
1928	.....			9,577	9,577
1929	34			5,856	5,890
1930	32	1,962	183	2,145	2,177
1931	.....	1,202	454	1,656	1,656
1932	.....	327	386	713	713
1933	.....	1,000	133	1,133	1,133
1934	.....	6,225	416	6,641	6,641

Source: Austria, Statistisches Department, Statistik des Auswartigen Handels.

BELGIUM

Production

Belgium has to import all raw materials for its paper industry. The official statistics do not distinguish between wood pulp and other pulps used for paper so that the following data cover "Pulp for paper of WOOD, STRAW, ESPARTO and similar fibres."

Imports			Exports		
	Tons	Value (1000 francs)		Tons	Value (1000 francs)
1925	143,608	113,522	1925	2,812	1,590
1926	140,929	192,476	1926	10,389	6,676
1927	155,273	198,648	1927	6,608	5,862
1928	174,374	222,423	1928	9,065	6,587
1929	174,598	226,537	1929	8,781	6,830
1930	139,656	185,117	1930	7,461	5,585
1931	189,750	163,877	1931	12,169	8,320
1932	173,973	109,943	1932	13,974	7,464
1933	143,324	82,084	1933	20,808	10,089
1934	140,477	80,109	1934	28,076	12,538

Source: Belgium, Ministere des Finances, Bulletin mensuel du commerce.

Imports and Exports by Countries (Tons)

	1933 Imports	1933 Exports	1934 Imports	1934 Exports
Norway	40,183		45,477	
Sweden	51,325		43,114	
Finland	29,152		23,280	
Germany	13,127	402	14,258	134
U. S. A.	3,556		5,065	
Canada	2,391		4,178	
Czechoslovakia	957		1,080	
Great Britain		10,818		20,648
France		9,077		6,780
Netherlands		424		320
All Others	2,633	87	4,025	194
Total	143,324	20,808	140,477	28,076

Source: Belgium, Ministere des Finances, Bulletin mensuel du commerce.

BRAZIL

Production

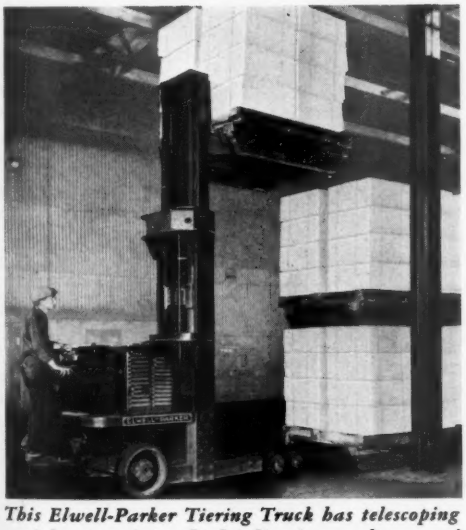
No official statistics of production of wood pulp obtainable.

Imports

	Tons	Value in milreis	Imports from:[1]	1933 Tons
1925	26,661	11,603,710	Great Britain	32,948
1926	24,319	10,434,447	Finland	16,385
1927	33,773	16,239,665	Sweden	13,245
1928	54,100	25,194,294	Germany	6,899
1929	54,747	24,666,685	Norway	2,903
1930	42,133	20,234,943	Czechoslovakia	450
1931	32,056	19,861,545	Others	563
1932	48,217	21,661,210		
1933	73,393	31,161,408		

Part of a large fleet of Elwell-Parker Trucks at the Soundview plant. All these Trucks loaded, pass through mill doors. The fork truck will load a boxcar with baled pulp in 50 minutes.

There Is No Middle Ground



This Elwell-Parker Tiering Truck has telescoping uprights, permitting high piling in warehouse and quick taking down of bales for delivery by the same truck to shipping dock.

Either you move at each trip a larger tonnage, at faster speed, and for less than your former cost, or—you are accumulating a deficit in your materials handling operations that will have to be absorbed out of net profits, or not absorbed at all.

Material handling in the Pulp and Paper Industry accounts for an important share of the total production cost. It is either a profit-*saving* activity or an unjustified waste. *There is no middle ground.*

Elwell-Parker knows how to build such efficient and modern systems for handling pulp and paper that these usually pay their whole original cost in a year or less.

These pictures show an ideal installation at the Soundview Pulp Co., Everett, Washington. Plans have been completed to double the capacity of the plant, but no changes will be required in the warehouse, as the high-tiering Elwell-Parker Truck makes it feasible to pile 3 high all over the warehouse, instead of 2 high on only part of the area, as heretofore.

Elwell-Parker Engineers, specialists in modern plant transportation of pulp and paper, will gladly call upon you. Their experience should be valuable and your request will not obligate you. The Elwell-Parker Electric Company, 4231 St. Clair Avenue, Cleveland, Ohio.

SEATTLE . . . COLBY STEEL & ENGINEERING CO.
456 Central Bldg., Telephone: ELliott 5722

SAN FRANCISCO . . . IRA G. PERIN
200 Davis Street, Telephone: SUtter 1476 • Also Los Angeles

New ELWELL·PARKER trucks

ESTABLISHED 1893 • BUILDING POWER INDUSTRIAL TRUCKS SINCE 1906

[1]Countries shown are those from which shipments were made, not necessarily the country of origin of pulp.

Source: Diretoria de Estadistica Economica do Tetsouro Nacional, Brazil.

In 1930 wood pulp originating from:

Finland supplied	33%	of total imports
Sweden supplied	27%	"
Germany supplied	20%	"
Great Britain supplied	14%	"
Norway supplied	6%	
	100%	

Exports

No exports of wood pulp listed in official statistics of Brazil.

CHILE

Production

No government figures on wood pulp industry in Chile available. No capacity listed in Dean's "Paper Makers' Directory of All Nations."

Imports (Short Tons)

	Total Imports
1928	8,432
1929	8,717
1930	13,642
1931	7,766
1932	12,051
1933	12,211
1934	9,001

Imports (By Countries) (Short Tons)

	1934	1932
Sweden	8,209	5,838
Norway	425	1,656
Great Britain	279	.....
Germany	40	945
United States	37	.....
Finland	11	472
Others	.....	3,140
Total	9,001	12,051

Source: Chile, Dirrecion General de Estadistica, Estadistica Annual.

CHINA

"At the present time no pulp is manufactured in China by the Machine process. In an effort to become less dependent upon the importation of foreign paper and pulp, the Ministry of Industries has been studying the feasibility of establishing mills in the vicinity of Wenchow. The three sites under consideration have been chosen because of their proximity to the timber supply and their convenient location for transportation." U. S. Vice Consul Julius Wadsworth, Shanghai, October 1, 1935.

Imports
Sulphite
(Only grade imported)

1931	94
1932	5,677
1933	8,148
1934	11,607

Source: Trade Information Bulletin No. 827 of the U. S. Department of Foreign and Domestic Commerce.

U. S. LEADING SUPPLIER OF PAPER PRODUCTS TO CHINA IN 1935

The United States was the leading supplier of paper and woodpulp to China during 1935, a report to the Commerce Department from its Shanghai office shows.

Total imports into China under this classification in 1935 amounted to 25,749,600 gold units ($17,406,000), an increase of 18 per cent over 1934. The United States accounted for 4,526,000 gold units ($3,060,000), or 18 per cent of the total, followed by Japan with 15 per cent; Germany, 14 per cent; and Canada, 13 per cent. Imports from the United States during 1935 increased 66 per cent over 1934; those from Germany, 65 per cent; and from Canada, 47 per cent. Imports from Japan, Sweden and Norway, on the other hand, registered only minor increases, the report states.

China's chief imports of United States paper products in order of importance comprise paperware, newsprint, drawing, document, bank-note and bond paper. Items of lesser importance are cards, bristol board, blotting paper, fancy cover papers and printing paper. In a general way, it is pointed out, American paper products hold first place in China due to ability to supply quality goods in a comparatively short space of time. A substantial share of American business consists of special lines and product particularly suited to the Chinese market.

Imports of all kinds of paper into China in the first two months of the current year amounted to 2,715,000 gold units ($1,824,000), a decrease of 35 per cent compared with the corresponding period of 1935. Germany was the chief supplier, accounting for 28 per cent while Japan and the United States each supplied 16 per cent, according to the Commerce Department.—Bureau of Foreign and Domestic Commerce.

CANADA

Pulp Made for Sale (Short Tons)

	Mechanical	Bleached Sulphite	Unbleached Sulphite	Sulphate and Soda	Screenings	Total
1925	410,359	208,648	272,764	184,034	42,153	1,117,958
1926	429,286	235,975	297,057	191,463	44,016	1,197,797
1927	256,265	282,897	233,232	193,033	51,009	1,016,436
1928	201,636	277,863	243,730	198,554	47,834	969,617
1929	241,739	301,595	249,143	184,336	52,148	1,028,961
1930	233,549	272,770	221,059	120,034	30,623	878,035
1931	194,397	278,425	155,850	78,561	37,427	744,660
1932	144,318	234,878	89,173	71,840	25,711	565,920
1933	156,632	334,482	133,277	100,341	29,290	754,022
1934	155,919	318,309	135,492	121,944	39,456	771,120

Selling Value at Mill of Pulp Made for Sale

	Mechanical	Bleached Sulphite	Unbleached Sulphite	Sulphate and Soda	Screenings	Total
1925	$11,637,708	$15,584,571	$13,723,814	$10,557,713	$908,954	$52,412,760
1926	11,609,336	18,178,604	15,325,384	11,132,132	847,740	57,093,196
1927	6,752,928	20,633,520	12,691,580	9,908,107	898,061	50,884,196
1928	4,907,434	20,508,497	11,276,913	11,210,619	711,417	48,614,880
1929	5,955,114	22,219,721	11,311,418	10,518,962	772,524	50,777,739
1930	5,812,862	18,263,411	9,884,295	7,652,046	435,249	42,047,863
1931	4,440,856	15,592,737	5,748,885	4,556,802	437,410	30,776,690
1932	2,780,451	11,863,822	2,879,418	3,809,644	199,824	21,533,159
1933	2,593,038	15,059,959	3,817,424	4,615,211	299,431	26,385,063
1934	2,854,415	16,899,982	4,672,630	5,683,396	363,155	30,473,578

Average Selling Value per Ton at Mill of Pulp Made for Sale

	Mechanical	Bleached Sulphite	Unbleached Sulphite	Sulphate and Soda	Screenings	Total
1925	$28.36	$74.69	$50.31	$57.37	$21.56	$46.88
1926	27.04	77.04	51.59	58.14	19.26	47.67
1927	26.35	72.94	54.42	51.33	17.61	50.06
1928	24.34	73.81	46.27	56.46	14.87	50.13
1929	24.63	73.67	45.40	57.06	14.81	49.35
1930	24.89	66.96	44.71	63.75	14.21	48.16
1931	22.84	56.00	36.89	58.00	11.69	41.33
1932	19.27	50.41	32.29	53.03	7.77	38.05
1933	16.55	45.02	28.64	46.00	10.22	34.99
1934	18.30	53.09	34.48	46.60	9.20	39.51

Source: Canada, Dominion Bureau of Statistics, Forestry Branch.

CANADA

Total Capacity (Short Tons)

	Mechanical Pulp Mills		Chemical Pulp Mills		
	Total Rated Capacity of Mills Tons	Output as % of Rated Capacity	Total Rated Capacity of Mills Tons	Output as % of Rated Capacity	Total Wood Pulp Capacity
1925	2,096,180	77.4	1,199,867	90.4	3,296,047
1926	2,457,552	77.4	1,344,045	93.1	3,801,597
1927	2,848,349	67.5	1,561,824	81.9	4,410,173
1928	3,184,425	66.8	1,628,795	85.5	4,813,220

Quality
SULPHITE
PULP
PUGET SOUND
PULP & TIMBER COMPANY
BELLINGHAM, WASH.
DOMESTIC & EXPORT
SHIPMENTS

1929	3,276,756	73.9	1,793,704	83.7	5,070,460
1930	3,521,570	64.8	1,947,483	65.1	5,469,053
1931	3,199,106	63.0	1,844,774	58.9	5,043,880
1932	3,322,213	51.05	1,879,096	48.6	5,201,309
1933	3,225,255	56.57	1,858,549	58.8	5,083,804

Source: Canada, Dominion Bureau of Statistics, Forestry Branch.

Production (Short Tons)

	Sulphite							
	Bleached	Unbleached	Total	Sulphate and Other	Total Chemical	Mechanical	Screenings	Total
1910	.....	.....	.....	.....	.....	104,409	370,195	.....	474,604
1913	.....	.....	.....	.....	.....	254,408	600,216	.....	854,624
1915	.....	.....	.....	.....	.....	331,029	743,776	.....	1,074,805
1920	138,624	515,649	654,273	194,255	848,528	1,090,114	21,460	1,960,102
1925	227,465	615,320	842,785	242,207	1,084,992	1,621,917	65,598	2,772,507
1926	256,868	738,235	995,103	256,075	1,251,178	1,901,268	77,345	3,229,791
1927	289,313	726,747	1,016,060	262,512	1,278,572	1,922,124	78,282	3,278,978
1928	304,769	812,458	1,117,227	256,969	1,374,196	2,127,699	106,150	3,608,045
1929	324,548	911,684	1,236,232	250,104	1,486,336	2,420,774	114,119	4,021,229
1930	293,394	783,410	1,076,804	188,253	1,265,057	2,283,130	71,158	3,619,345
1931	301,357	640,222	941,579	145,156	1,086,735	2,016,480	64,745	3,167,960
1932	256,478	512,593	769,071	144,367	913,438	1,696,021	53,789	2,663,248
1933	355,812	553,801	909,613	182,988	1,092,601	1,824,553	62,408	2,979,562
1934	340,262	650,380	990,642	221,077	1,211,719	2,340,441	84,175	3,636,335
1935	.....	.....	1,025,000	206,000	1,231,000	2,458,000	.....	3,689,000

Source: Canada, Dominion Bureau of Statistics, Forestry Branch.

CANADA

Exports (Short Tons)

	Sulphite									
	Bleached	Unbleached	Total	Sulphate	Other	Total Chemical	Mechanical	Screenings	Total	Total Exp. as % of Total Prod.
1910	.....	.....	.....	.....	.....	40,170	288,807	.....	328,977	69.3%
1913	.....	.....	.....	.....	5,060	55,623	237,486	.....	298,169	34.8%
1915	.....	.....	.....	.....	.....	157,469	206,701	.....	364,170	33.9%
1920	.....	.....	.....	.....	.....	515,641	304,344	.....	819,985	41.8%
1925	185,888	265,553	451,441	149,722	.....	601,163	360,204	.....	961,367	34.7%
1926	200,995	254,376	455,371	168,132	.....	623,703	382,077	.....	1,005,780	31.1%
1927	237,227	192,557	429,784	169,694	.....	599,478	260,831	18,845	879,154	26.8%
1928	251,542	214,126	465,668	162,771	.....	628,439	203,670	31,693	863,802	23.9%
1929	253,809	196,978	450,787	134,321	.....	585,108	209,332	36,408	830,848	20.7%
1930	249,098	187,424	436,522	86,092	5,186	527,800	208,758	23,662	760,220	21.0%
1931	261,700	123,721	385,421	54,993	3,489	443,903	165,098	13,536	622,537	19.7%
1932	207,705	80,713	288,418	38,527	1,588	328,533	116,229	7,530	452,292	16.9%
1933	295,111	100,604	395,715	59,320	4,737	459,772	132,152	16,585	608,509	20.4%
1934	274,144	102,316	376,460	88,037	7,950	472,447	120,121	13,073	605,641	16.6%
1935	.....	.....	.....	.....	.....	538,419	124,049	.....	662,468	.....

Value of Wood Pulp Exports (In Thousands of Dollars)

	Sulphite								Average Value per Ton of	
	Bleached	Unbleached	Total	Sulphate	Other	Total Chemical	Mechanical	Total*	Chemical	Mechanical
1925	$14,050	$14,150	$28,200	$ 9,159	$.....	$37,359	$10,573	$47,932	$62.14	$29.35
1926	15,734	14,394	30,128	10,444	.....	40,571	11,506	52,078	65.05	30.11
1927	18,407	10,270	28,677	10,193	.....	38,870	7,764	46,996	64.84	29.77
1928	19,113	10,739	29,852	9,596	.....	39,448	5,546	45,615	62.77	27.23
1929	19,247	9,714	28,961	7,856	.....	36,817	5,907	43,368	62.92	28.22
1930	17,955	9,201	27,156	5,152	370	32,678	5,967	39,060	61.91	28.58
1931	16,283	5,147	21,430	3,617	179	25,226	4,606	30,057	56.83	27.90
1932	11,182	2,606	13,788	2,419	83	16,290	2,562	18,930	49.58	22.04
1933	14,145	3,068	17,213	3,050	182	20,445	2,688	23,355	44.47	20.34
1934	14,607	3,373	17,980	4,217	343	22,541	2,728	25,445	47.71	22.70
1935	.....	.....	.....	.....	.....	24,994	2,632	27,626	.....	.....

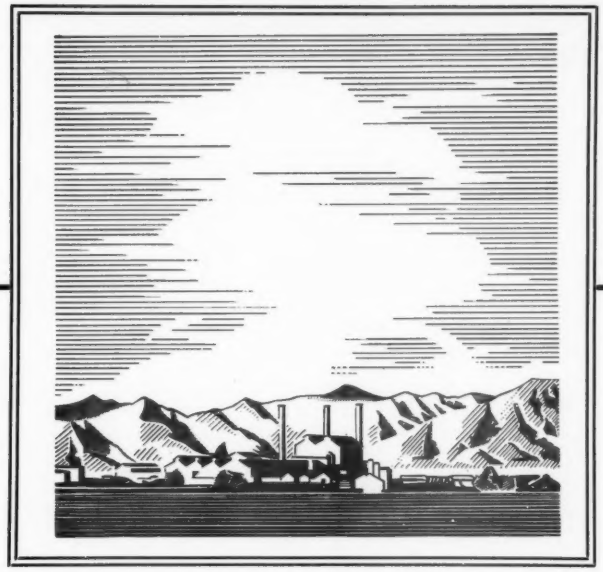
*Includes value for exports of screenings.
Source: Canada, Dominion Bureau of Statistics, Forestry Branch.

CANADA

Total Exports (Including Screenings)

TO:	United States	Great Britain	France	Japan	All Others	Total All Countries
1915	318,498	18,488	18,335	8,666	183	364,170
1920	624,933	120,074	32,719	24,538	17,721	819,985
1925	823,857	72,187	12,823	45,858	6,642	961,367
1930	646,998	22,580	14,244	54,257	22,141	760,220
1931	491,731	38,971	8,415	59,954	23,475	622,537
1933	486,579	20,623	(1)	(1)	101,307	608,509
1934	478,959	38,549	(1)	(1)	88,133	605,641
1935	530,664	51,885	.....	.....	.....	662,468
			Total Chemical			
1915	147,694	951	.....	8,666	158	157,469
1920	419,270	51,983	6,916	24,538	12,934	515,641
1925	542,109	2,981	3,573	45,858	6,642	601,163
1930	429,790	7,580	14,244	54,045	22,141	527,800
1931	341,495	11,804	8,415	58,714	23,475	443,903
1933	344,355	14,993	(1)	(1)	100,424	459,772
1934	351,450	32,970	(1)	(1)	88,027	472,447
			Total Mechanical			
1915	170,804	17,537	18,335	.....	25	206,701
1920	205,663	68,091	25,803	.....	4,787	304,344
1925	281,748	69,206	9,250	.....	.....	360,204
1930	193,758	15,000	.....	.....	.....	208,758
1931	137,931	27,167	.....	.....	.....	165,098
1933	126,322	5,630	.....	.....	.....	132,152
1934	114,342	5,379	.....	.....	.....	120,121
			Screenings			
1930	23,450	.....	.....	212	.....	23,662
1931	12,305	.....	.....	1,231	.....	13,536
1933	15,702	.....	.....	.....	883	16,585
1934	12,967	.....	.....	.....	106	13,073

(1) Included in All Others.
Source: Canada, Dominion Bureau of Statistics, Forestry Branch.



SALT CAKE

98% + Sodium Sulphate

SODA ASH

99½% Sodium Carbonate

SALT TRONA CAKE

Made at
Trona on Searles Lake,
California

SODA TRONA ASH

American Potash & Chemical Corporation

Western Office
609 So. Grand Ave., Los Angeles

Eastern Office
70 Pine St., New York

Manufacturers of Trona Brand Muriate of Potash and Three Elephant Borax

CANADA

Chemicals, etc., Used in the Manufacture of Wood Pulp

Materials	Unit of Measure	Quantity 1932	Quantity 1933	Quantity 1934	Total Value 1932	Total Value 1933	Total Value 1934
Sulphur	Tons	105,521	121,400	127,541	$2,495,137	$2,828,686	$2,932,928
Limestone	"	119,127	140,233	151,483	342,862	389,600	395,947
Lime	"	59,615	75,821	80,449	536,941	641,844	670,515
Soda Ash	"	854	866	471	32,656	33,550	18,486
Liquid Chlorine	"	13,431	19,625	19,028	754,119	1,067,620	1,001,937
Other Bleach	"	6,254	7,487	3,829	145,414	169,096	86,563
Salt Cake	"	24,301	29,563	34,559	489,343	580,251	655,905
Common Salt	"	7,887	8,873	(1)	74,668	81,673	(1)
Pulp Stones	No.						
For 2-ft. wood	"	210	321	378	65,450	98,475	103,811
For 2½-ft. wood	"	139	95	84	46,436	31,945	29,680
For 4-ft. wood	"	222	199	268	249,377	223,635	292,359
All Other Materials (2)					793,361	1,108,759	1,644,149
Total					$6,025,764	$7,255,134	$7,832,280

(1) Reported by less than 3 firms.

(2) 1932 includes Caustic Soda, Pyrites, Alum and Soda Bisulphite.
1933 includes Caustic Soda, Pyrites, Alum, each of which is reported by less than 3 firms.
1934 includes Caustic Soda, Pyrites, Alum, Common Salt, Liquid Caustic Permanganate and Bauxite, each of which is reported by less than 3 firms.

Average Value per Unit of Materials used in Manufacture of Wood Pulp

Materials	Unit of Measure	Average Value 1932	Average Value 1933	Average Value 1934
Sulphur	Tons	$23.65	$23.30	$22.99
Limestone	"	2.88	2.78	2.61
Lime	"	9.00	8.47	8.33
Soda Ash	"	38.23	38.74	39.24
Liquid Chlorine	"	56.14	54.40	52.13
Other Bleach	"	23.26	22.59	22.60
Salt Cake	"	20.13	19.63	18.97
Common Salt	"	9.47	9.20	.....
Pulp Stones	No.			
For 2 ft. wood	"	311.67	306.78	274.63
For 2½ ft. wood	"	334.07	336.26	353.33
For 4 ft. wood	"	1,123.00	1,123.79	1,090.14

Source: Canada—Dominion Bureau of Statistics—Forestry Branch.

CANADA

Consumption (Short Tons)

	Sulphite Bleached	Sulphite Unbleached	Total	Sulphate and Other	Total Chemical	Mechanical	Screenings	Total
1925	41,897	370,251	412,148	93,751	505,899	1,263,066	65,598	1,834,563
1926	56,130	501,586	557,716	89,973	647,689	1,521,914	77,345	2,246,948
1927	52,298	556,515	608,813	93,605	702,418	1,661,645	59,437	2,423,500
1928	53,520	620,007	673,527	94,465	767,992	1,924,218	74,457	2,766,667
1929	71,327	733,635	804,962	115,941	920,903	2,211,640	77,711	3,210,254
1930	45,587	608,923	654,510	98,669	753,179	2,076,976	47,496	2,877,651
1931	39,858	529,242	569,100	87,746	656,846	1,851,786	51,209	2,559,841
1932	48,934	444,952	493,886	104,399	598,285	1,579,832	46,259	2,224,376
1933	60,775	458,627	519,402	118,977	638,379	1,692,559	45,823	2,376,761
1934	66,205	556,150	622,355	125,090	747,445	2,220,352	71,102	3,038,899

Consumption equals production plus imports minus exports.

Imports (Short Tons)

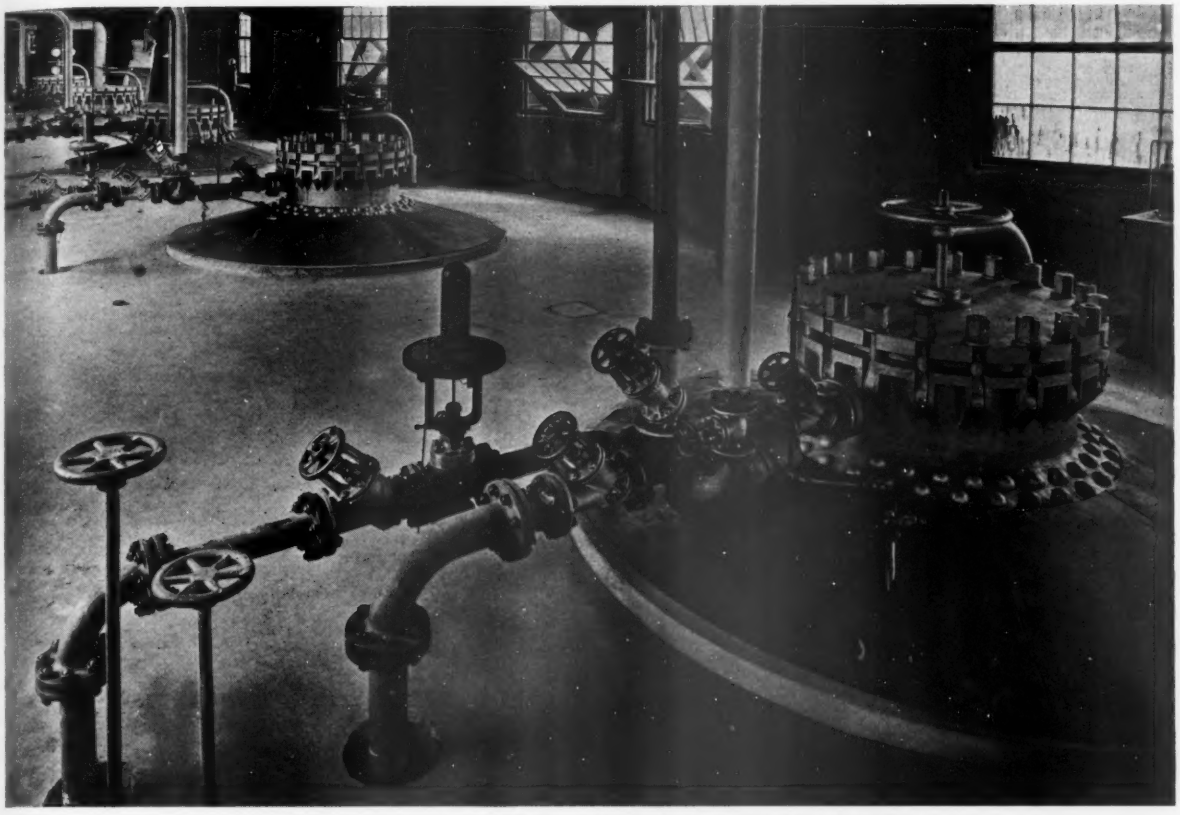
	Sulphite Bleached	Sulphite Unbleached	Sulphate	Soda	Total Chemical	Mechanical	Total
1925	320	20,484	.....	1,266	22,070	1,353	23,423
1926	257	17,927	.....	2,030	20,214	2,723	22,937
1927	212	22,325	.....	787	23,324	352	23,676
1928	293	21,675	.....	267	22,235	189	22,424
1929	588	18,929	.....	158	19,675	198	19,873
1930	1,291	12,937	1,672	22	15,922	2,604	18,526
1931	201	12,741	983	89	14,014	404	14,418
1932	161	13,072	6	141	13,380	40	13,420
1933	74	5,430	2	44	5,550	158	5,708
1934	87	8,086	.....	.....	8,173	32	8,205

Practically all from United States.
All except 11 tons in 1934.
Source: Dominion Bureau of Statistics, Forestry Branch

CZECHOSLOVAKIA

Imports (Short Tons)
(Value in 1,000 Czecho. crowns)

	Chemical Short Tons	Chemical Value	Chemical Short Tons	Chemical Value	Total Short Tons	Total Value
1920	5,049	37,844	6,373	14,422	11,422	52,266
1925	4,220	7,774	4,014	2,955	8,234	10,729
1926	3,071	5,021	4,968	3,514	8,039	8,535
1927	4,776	9,719	4,529	2,110	9,035	11,829
1928	5,984	11,516	11,213	8,125	17,197	19,641
1929	7,301	16,218	11,338	9,317	18,639	25,535
1930	7,772	16,294	8,390	5,668	16,162	21,962
1931	8,609	16,323	3,381	2,001	11,990	18,324
1932	5,622	8,351	1,056	1,052	6,678	9,403
1933	4,907	.....	342	.....	5,249	6,800
1934	4,863	6,755	370	131	5,233	6,886



View down the operating floor. Cover liners, valves and fittings, all ESCO Stainless Steel.

Trim as a modern kitchen

. . . . . is the operating floor of Weyerhaeuser Timber Company's new pulp mill at Everett, Wash. This is made possible by valves and fittings of

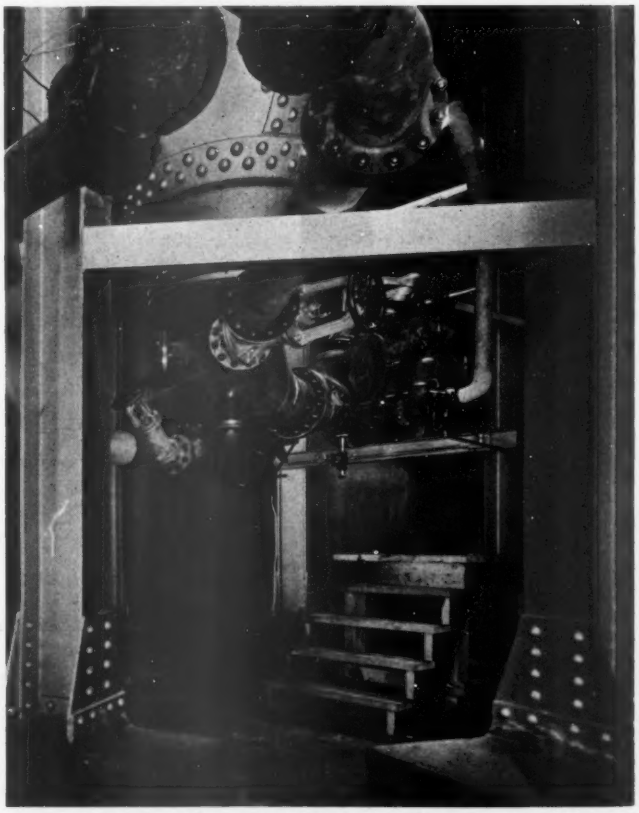
ESCO

STAINLESS STEEL

Our engineers will gladly confer with you on your problems

Electric Steel Foundry Company

Portland, Oregon Seattle, Washington



Bottom of Digesters with special Y type inlet on the bottom blow valves and piping, ESCO Stainless Steel

Exports (Short Tons)
(Value in 1,000 Czecho. crowns)

	Chemical		Mechanical		Total	
	Short Tons	Value	Short Tons	Value	Short Tons	Value
1920	23,091	18,282	871	2,223	23,962	189,505
1925	79,116	155,768	1,149	395	80,265	156,163
1926	85,661	173,076	56	38	85,717	173,113
1927	101,811	199,804	72	71	101,883	199,875
1928	103,105	201,201	101	90	103,206	201,291
1929	100,863	197,243	40	28	100,903	197,271
1930	112,115	201,493	98	32	112,213	201,525
1931	128,772	181,055	10	62	128,782	181,117
1932	91,104	98,942	6	47	91,110	98,989
1933	107,333	.....	8	.....	107,341	101,351
1934	110,965	117,784	12	46	110,977	117,830

Source: Czechoslovakia, Statni Urad Statisticky, Rapports.

CZECHOSLOVAKIA

Production (Short Tons)

	Sulphite	Mechanical	Total
1925	211,776	55,115	266,891
1926	209,570	58,422	267,992
1927	220,600	55,115	275,715
1928	259,045	55,115	314,160
1929	272,271	83,776	356,047
1930	261,245	83,776	345,021
1931	269,868	78,639	348,507
1932	198,665	63,934	262,599
1933	202,840	71,650	274,490
1934	208,837	82,673	291,510

Source: No Government figures on production of wood pulp. 1925-1930, League of Nations Statistical Year Book.
Sulphite: 1930-1934, Wirtschaftliche Vereinigung der Papier industrie, Prague.
Mechanical: 1930-1933, U. S. Department of Foreign and Domestic Commerce.
Mechanical: 1934, League of Nations Statistical Year Book.

Consumption (Short Tons)

	Chemical	Mechanical	Total
1925	136,880	57,980	194,860
1926	126,980	63,334	190,314
1927	123,565	59,302	182,867
1928	161,924	66,227	228,151
1929	178,709	95,074	273,783
1930	156,902	92,068	248,970
1931	149,705	82,010	231,715
1932	113,183	64,984	178,167
1933	100,414	71,984	172,398
1934	102,735	83,031	185,766

Consumption equals Production plus Imports minus Exports.

DENMARK

Production (Short Tons)

The Danish paper industry is largely dependent upon foreign sources for its raw materials. In 1934 the mills utilized a total of 37,537 short tons of chemical pulp, all of which was imported from Sweden and Finland; 9,060 short tons of mechanical pulp imported from Norway, Finland and Sweden; and 6,655 tons of mechanical pulp produced from Danish wood." Report of Assistant Trade Commissioner P. H. Pearson, U. S. Department of Commerce.

	Mechanical Short Tons
1930	4,058
1931	4,215
1932	3,873
1933	6,614
1934	6,655

Source: Denmark, Productionstatistiske, Det Statistiske Departement.

Imports (Short Tons)

	Total Chemical	Mechanical	Total
1925	17,026	13,205	30,231
1926	22,062	16,104	38,166
1927	24,363	17,791	42,154
1928	29,780	15,113	44,893
1929	28,286	17,685	45,971
1930	27,667	13,270	40,937
1931	27,263	14,502	41,765
1932	30,387	13,149	43,536
1933	35,110	9,792	44,902
1934	37,537	9,060	46,597

Source: Denmark Statistik, Handelsstatatistiske Meddelelser, Det Statistiske Department.
Exports—None.

Consumption (Short Tons)

	Total Chemical	Mechanical	Total
1925	17,026	13,205	30,231
1926	22,062	16,104	38,166
1927	24,363	17,791	42,154
1928	29,780	15,113	44,893
1929	28,286	17,685	45,971
1930	27,667	17,328	44,995
1931	27,263	18,717	45,980
1932	30,387	17,022	47,409
1933	35,110	16,406	51,516
1934	37,537	15,715	53,252

Consumption equals Production plus Imports.

ESTHONIA

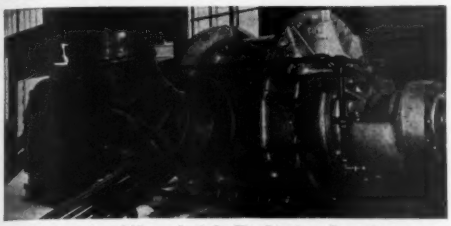
(Short Tons)

	Consumptoin Total	Imports (All Chemical)	Production		
			Total Chemical	Mechanical	Total
1920			3,544	5,713	9,257
1925			17,932	20,856	38,788
1926	47,067	13,352	15,542	20,196	35,738
1927	39,669	1,770	28,475	21,553	50,028
1928	42,391	3,995	44,434	23,777	68,211
1929	38,339	3,429	55,341	19,429	74,770
1930	37,326	3,993	62,008	19,491	81,499
1931	16,966	3,021	74,582	16,826	91,408
1932	8,650	1,581	67,146	16,656	83,802
1933	6,864	2,049	72,121	13,781	85,902
1934		3,548			

Consumption equals production plus imports minus exports.
Production Source: Riigi Statistika Keskburoo, Eesti Kuukiri.
Imports Source: Esthonia, Riggi Statistika Keskburoo, Eesti Majaudes Statistique economique.

	Exports (By Countries—Short Tons					Exports	
	Mechanical		Chemical				
	1933	1934	1933	1934	Year	Short Tons	Value (in 1000 kronor)
France	15,574	8,861	19,691	16,143	1926	2,023	119
Great Britain	0	3,613	22,082	21,133	1927	12,129	1,930
United States			16,527	13,945	1928	29,815	4,697
Spain			1,190	6,303	1929	39,860	6,532
Belgium			1,615	2,951	1930	48,166	7,230
Denmark	1,567	2	0	0	1931	77,463	9,090
Argentine			0	56	1932	76,733	5,479
Brazil			1,014	356	1933	81,087	6,075
Holland			219	135	1934	74,544	7,190
Italy			0	55			
Greece			16	0			

SKF -equipped barker built by The Stetson-Ross Machine Company



SKF -equipped blower built by The Bingham Pump Company

SKF -equipped knot borers built by The Sumner Iron Works

The Minton Dryer

and Auxiliary Equipment

in the new Weyerhaeuser pulp mill

SKF-EQUIPPED

THERE'S hardly a paper mill in the world that does not have SKF Bearings on some of its major equipment. In the new unbleached sulphite Weyerhaeuser pulp mill, SKF are used on the Minton Dryer and other auxiliary equipment, a few of which are shown above.

SKF Bearings have earned their right to be called the pioneer paper mill bearing because they have functioned for years on paper mill applications of all kinds. Their liberal use assures smooth operation, long life and low maintenance costs. Send for new catalog on paper mill applications.

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SKF

BALL & ROLLER BEARINGS

Japan			111	111
Latvia			661	0
Portugal			111	0
Sweden		66	75	103
Germany			529	565
Finland			0	24
Czechoslovakia			55	66
	17,141	12,542	63,896	61,946

Source: Central Bureau of Statistics of Esthonia, Foreign Commerce.

FINLAND

Capacity (Short Tons)

1934 Capacity		Contemplated Expansion
1,068,129	Sulphite	84,000 to 86,000
306,439	Sulphate	220,460
694,118	Mechanical	25,463
2,068,686	Total	245,923 to 247,923

Source: United States Consular Report.

Production (Short Tons)

	Bleached Sulphite	Unbleached Sulphite	Total Sulphite	Bleached Sulphate	Unbleached Sulphate	Total Chemical	Mechanical	Total
1913	26,088	61,980	88,068	1,289	70,027	159,384	170,454	329,838
1920	17,994	113,812	131,806	17,266	40,451	189,523	167,121	356,644
1925	47,178	284,151	331,329	19,916	86,636	437,881	250,630	688,511
1926	46,223	318,995	365,218	22,521	98,332	486,071	256,089	742,160
1927	52,600	365,115	417,715	25,563	102,441	545,719	311,249	856,968
1928	65,715	417,498	483,213	26,327	134,571	644,111	344,398	988,509
1929	68,555	447,997	516,552	30,756	141,769	689,077	383,073	1,072,150
1930	85,382	483,083	568,465	27,670	180,458	776,593	409,341	1,185,934
1931	82,604	491,217	573,821	20,007	191,428	785,256	409,848	1,195,104
1932	120,445	583,530	703,975	34,730	219,835	958,540	433,446	1,391,986
1933	.....	.....	831,518	287,849		1,119,367	558,809	1,678,176
1934	.....	.....	923,046	317,200		1,240,246	.....	.....

Source: 1913-1930, Suomen Virallinen Telasto Statistiska Byran, Finland. 1930-1934, Statistika Arsbok for Finland.

Consumption

	Sulphite	Sulphate	Total Chemical	Mechanical	Total
1925	92,527	20,928	113,455	170,117	283,572
1926	88,443	31,005	119,448	175,718	295,166
1927	120,559	24,394	144,953	198,611	343,564
1928	87,354	35,336	122,690	192,593	315,283
1929	110,932	44,474	155,406	205,874	361,280
1930	173,627	32,402*	206,029	235,793	441,822
1931	106,225	32,403*	138,628	236,352	374,980
1932	84,482	39,732	124,214	234,684	358,898
1933	177,505	62,362	239,867	329,622	569,489
1934	264,703	91,372	356,075	.....	.....

Consumption equals production minus Exports. (Imports in most years less than 100 tons.)
*Average for two years estimated.

FINLAND

Exports (Short Tons) (By Quantity)

	Sulphite	Sulphate	Total Chemical	Mechanical	Total
Average per year for 1911-1913	.....	.....	82,593	51,513	133,725
1925	238,802	85,624	324,426	80,513	404,939
1926	276,775	89,848	366,623	80,371	446,994
1927	297,156	103,610	400,766	112,638	513,404
1928	395,859	125,562	521,421	151,805	673,226
1929	405,620	128,051	533,671	177,199	710,870
1930	394,838	129,668	524,506	173,548	698,054
1931	467,596	225,090	692,686	173,496	866,182
1932	619,493	214,833	834,326	198,762	1,033,088
1933	654,013	225,487	879,500	229,187	1,108,687
1934	658,343	225,828	884,171	274,421	1,158,592
1935	771,680	263,200	1,034,880	324,800	1,359,680

Exports (By Value)—f.o.b., 1,000 Finnish Marks

	Sulphite	Sulphate	Total Chemical	Mechanical	Total
1913	.....	.....	14,406	4,042	18,448
1927	.....	.....	804,020	108,250	912,270
1928	.....	.....	940,923	129,281	1,070,204
1929	.....	.....	975,142	155,928	1,131,070
1930	.....	.....	916,406	160,197	1,076,603
1931	.....	.....	954,263	151,113	1,105,376
1932	866,793	284,090	1,150,883	142,216	1,293,099
1933	905,568	275,580	1,181,148	155,722	1,336,870
1934	967,265	278,708	1,245,973	204,678	1,450,651

Source: Statistical Bureau of the Board of Customs, Finland.

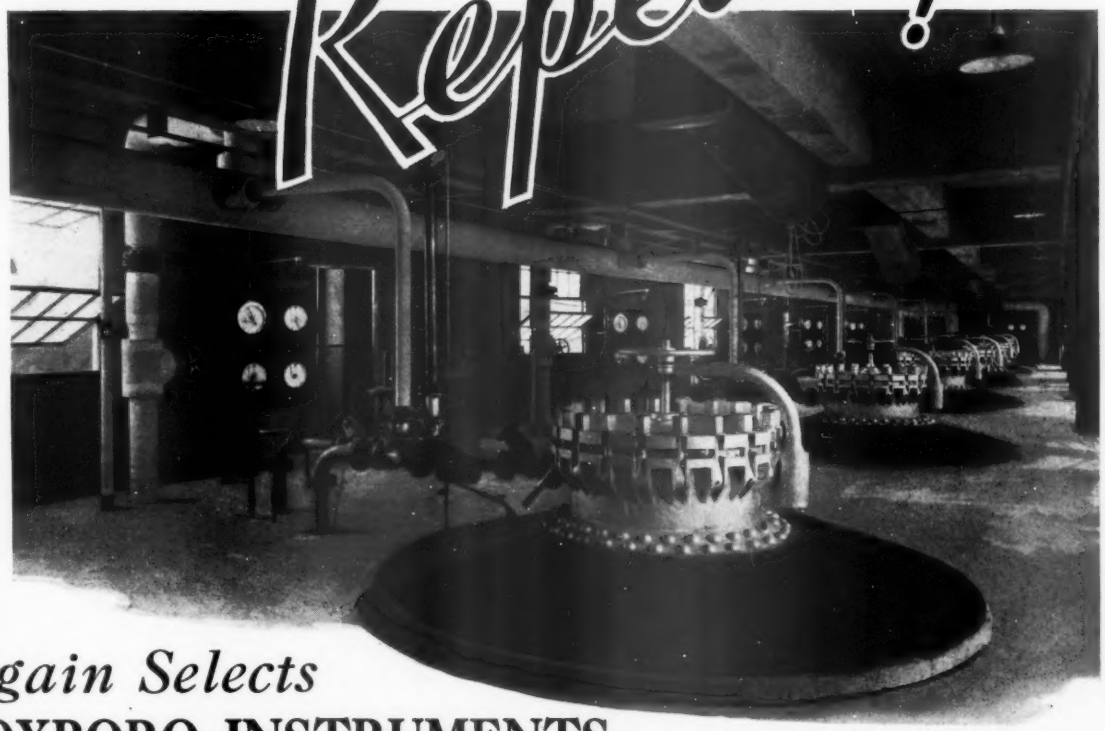
Expansion

"Additional output of 35,000 metric tons of sulphite pulp was added to Finnish wood pulp industry with the opening on June 22, 1935, of a new sulphite mill at Jakobstad."

"The new sulphite mill erected by the Enzo-Gutzeit-Tornator concern started work September 24, 1935, with an initial output of 80,000 metric tons of unbleached sulphate annually. Plans have been made so that this figure can be raised to 120,000 metric tons without difficulty."

Source: Finnish Paper and Timber Journal.

WEYERHAEUSER *Repeats!*



Again Selects
FOXBORO INSTRUMENTS
for New Pulp Mill at Everett

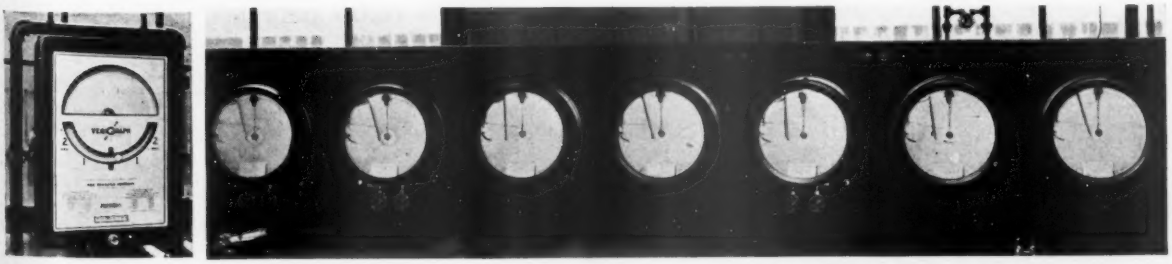
When, five years ago, Weyerhaeuser built their Longview sulphite pulp mill, it was completely equipped with FOXBORO Instruments from acid room to machine room. Now another Weyerhaeuser mill has arisen, this time at Everett, Washington, and again FOXBORO Instruments are used for controlling and recording temperature, pressure, flow and liquid level. Only one thing could account for this second endorsement of FOXBORO Instruments—and that is the *successful performance* of the instruments at Longview, throughout their four and one-half years of service.

Whether you produce chemical pulp, mechanical pulp, or any paper product from tissue to board, FOXBORO has the engineers, the experience and the instruments to help you.

FOXBORO
REG. U. S. PAT. OFF.

THE FOXBORO COMPANY
Neponset Ave.,
FOXBORO, MASS., U. S. A.

Makers of the VERIGRAPH for Moisture Control of Paper.
Western Offices: Portland, Ore., 816 Lewis Bldg.; Los Angeles, 2307 E. Eighth St.; San Francisco, 461 Market St.
Branches in 22 Other U. S. Cities.



FINLAND

Exports (By Countries)

TO:	Mechanical 1933	Mechanical 1934	Sulphite 1933	Sulphite 1934	Sulphate 1933	Sulphate 1934	Total 1933	Total 1934
England	150,369	200,202	299,525	316,272	89,244	76,162	539,138	592,636
United States	24,414	17,459	161,778	155,734	55,882	62,373	242,074	235,566
France	23,673	17,762	33,787	39,727	21,290	29,434	78,750	86,923
Italy	.....	.....	36,942	42,249	3,221	3,135	40,163	45,384
Germany	2,064	1,251	6,325	6,054	23,023	25,386	31,412	32,691
Belgium	3,499	2,927	20,872	20,363	5,428	3,664	29,799	26,954
Brazil	7,570	12,835	19,268	11,614	1,445	170	28,283	24,619
Japan	.....	.....	18,818	21,045	3,381	572	22,199	21,617
Denmark	4,344	3,427	10,446	11,193	.....	.....	14,790	14,620
Holland	.....	.....	8,979	7,635	4,055	5,062	13,034	12,697
Sweden	356	1,696	542	2,986	.....	.....	898	4,682
Spain	.....	.....	7,761	5,209	636	1,106	8,397	6,315
Argentina	2,855	2,970	4,773	2,064	165	.....	7,793	5,034
British India	.....	.....	2,438	2,819	.....	.....	2,438	2,819
Mexico	525	1,141	.....	.....	.....	.....	525	1,141
Norway	.....	.....	850	.....	.....	.....	850	.....
Russia	.....	.....	28	.....	2,498	3,390	2,526	3,390
Estonia	.....	.....	2,012	3,198	.....	.....	2,012	3,198
Latvia	.....	.....	177	1,664	.....	.....	177	1,664
Others	9,518	12,751	18,692	8,517	15,219	15,374	43,429	36,642
	229,187	274,421	654,013	658,343	225,487	225,828	1,108,687	1,158,592

Source: Finland, Statistical Bureau of the Board of Customs.

Exports to United States, 1935

	Short Tons	Value
Mechanical	24,490	$ 428,905
Unbleached Sulphite	146,616	5,190,491
Bleached Sulphite	29,550	1,344,911
Unbleached Sulphate	62,173	1,766,856
Bleached Sulphate	4,113	159,584
Totals	266,942	$8,890,747
Total Value of 1934 exports to the United States		$6,734,505

Source: Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce.

FRANCE

Wood Pulp Requirements of the French Paper Industry

"The annual wood pulp requirements of the French paper industry have been estimated at 840,000 metric tons, according to an article recently appearing in the trade journal Le Papier. This total is divided as follows:

Mechanical pulp	400,000 tons
Unbleached Sulphite	260,000 tons
Bleached Sulphite	90,000 tons
Kraft pulp	90,000 tons

The same article states that:

French raw materials provide for only	10%	of the total requirements
Imported wood accounting for	19%	of the total requirements
Imported wood pulp for	63%	of the total requirements
Imported paper for	8%	of the total requirements

French forests produce only 4% of the requirements of the mechanical pulp and unbleached sulphite industries and none of the bleached sulphite. In kraft pulp the situation is somewhat better, about one-third of the consumption being manufactured from the maritime pine of the Landes region. It is pointed out that existing French resources could be used for 50% of the paper production, leaving 20% to be supplied by imported wood and 30% by imported wood pulp. Reforestation would eventually provide all the wood required by the French paper industry."—U. S. Consul B. M. Hulley, Nantes, November 1, 1935.

"Four mills making chemical pulp utilizing maritime pine have been in operation in the Landes region for some years. Mills manufacturing mechanical pulp have also been started but many of these establishments at present have been closed down or are in a precarious financial position. There are, however, paper mills manufacturing mechanical pulp for their own use from imported pulpwood. In the center of France a number of plants engaged in the manufacture of tanning materials from chestnut wood and bark have started the production of pulp as a by-product. Since the war, it is estimated, there has been an investment of 300,000,000 francs in plants manufacturing pulp for paper-making. The program recommended by those interested in the further development of the paper industry includes:

(1) an increase in import duties on woods and pulp for paper-making;
(2) the creation of new pulp mills utilizing only domestic products;
(3) a program of reforestation of spruce and pine, which should undertake the planting of 20,000 hectares of new forest land annually."

—Report of United States Assistant Trade Commissioner Joseph G. Stoval, Paris, August 26, 1935.

FRANCE

Total Production (Short Tons)		Total Consumption (Short Tons)	
1925	119,812	1925	469,052
1926	130,230	1926	537,103
1927	119,812	1927	423,362
1928	126,323	1928	545,698
1929	153,671	1929	639,627
1930	188,833	1930	704,014
1931	156,276	1931	594,448
1932	148,462	1932	586,890
1933	183,624	1933	748,815
1934	198,414	1934	762,651

Consumption equals estimated production plus imports minus exports.

Production: There are no official statistics on production of wood pulp in France available. The total production figure given above for 1934 is an estimated figure furnished by the French Commercial Attache's Office in New York City. Other production figures are estimates based on the League of Nations index of productive activity in the paper industry in France, 1925-1933.

FRANCE

Imports (Short Tons)

	Unbleached Sulphite	Unbleached Sulphate	Bleached Pulp	Chemical Total	Mechanical	Total
1913	.....	.....	.....	226,511	162,584	389,095
1925	.....	.....	.....	218,691	132,611	351,302
1926	.....	.....	.....	278,058	131,740	409,798
1927	.....	.....	.....	205,221	104,537	309,758
1928	.....	.....	.....	295,822	132,830	428,652
1929	.....	.....	.....	326,077	176,128	502,205
1930	.....	.....	.....	355,548	169,887	525,435
1931	.....	.....	.....	321,158	126,674	447,832
1932	.....	.....	.....	328,025	117,508	445,533
1933	216,636	80,778	138,073	435,487	132,380	567,867
1934	227,074	65,035	121,253	413,362	153,200	566,582

Source: Commerce Exterieur de la France, Ministere de Finances.

Imports (By Countries—Short Tons)
Chemical Pulp

	Sweden	Germany	Finland	Norway	Others	Total
1913	97,886	47,086	(1)	35,085	46,454	226,511
1925	98,345	31,331	18,288	24,279	46,448	218,691
1926	98,860	66,099	32,422	15,548	65,129	278,058
1927	97,962	29,998	23,278	9,009	44,974	205,221

HEWITT Conveyor Belting and Hose at WEYERHAEUSER

Satisfactory PAST PERFORMANCE caused the Pulp Division of the Weyerhaeuser Timber Company to purchase a number of HEWITT Maltese Cross Conveyor Belts for the New Everett Pulp Mill.

All of the rubber hose in the new mill bears the HEWITT Maltese Cross brand.

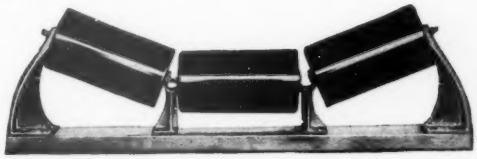
The conveyor belting was sold and installed by the James Brinkley Company of Seattle, Washington.

CHAIN BELT EQUIPMENT in the NEW WEYERHAEUSER PULP MILL

CHAIN BELT Rex Conveyor Rollers carry a large share of the chips and hogged fuel in the new Everett Pulp Mill.

Rex Roller Drive Chain transmits the power to drive a number of the conveyors.

CHAIN BELT equipment was sold and installed by the James Brinkley Company of Seattle, Washington.



Special Pulp Mill Equipment

Consisting of CHIP FEEDERS, MACHINE STOCK and BLENDING AGITATORS, FRACTIONATING ACCUMULATORS and CONVEYOR TRANSMISSION EQUIPMENT, was MANUFACTURED and INSTALLED by the JAMES BRINKLEY Company of SEATTLE.

HEWITT RUBBER CO.—Buffalo
CHAIN BELT CO.—Milwaukee

are represented in the Pulp and Paper Industry of the Pacific Coast by the

JAMES BRINKLEY CO.

Manufacturers and Sales Agents

417 Ninth Ave. South SEATTLE Main 0062

1928	92,699	57,128	35,526	24,776	85,693	295,822
1929	135,126	61,604	24,870	22,934	71,543	326,077
1930	132,461	79,496	34,593	27,261	81,737	355,548
1931	119,844	69,769	44,710	12,384	74,451	321,158
1932	108,909	77,279	51,574	16,035	74,228	328,025
1933	170,810	83,144	60,536	15,843	105,134	435,487
1934	158,524	86,723	71,596	16,836	79,683 (2)	413,362
Mechanical						
1934	80,759	2,073	18,748	44,062	7,578	153,220

(1) Included in others.
(2) Imports included from: Esthonia, 18,832; Austria, 13,636; Czechoslovakia, 12,870; Canada, 9,708; United States, 11,617. Source same as above.

Exports (Short Tons)

	Chemical	Mechanical	Total
1925	1,018	1,044	2,062
1926	2,026	899	2,925
1927	4,312	1,896	6,208
1928	5,079	4,198	9,277
1929	13,021	3,228	16,249
1930	9,642	612	10,254
1931	9,180	480	9,660
1932	6,911	194	7,105
1933	2,414	262	2,676
1934	2,011	334	2,345

Source: Commerce Exterieur de la France, Ministere de Finances.

GREECE

The Greek Paper Industry

"The manufacture of paper was a comparatively unimportant branch of industry in Greece up to 1925. At that time one of the largest mills went into production and at present there are about a dozen paper mills in the country. Only three, however, are important in terms of capital invested, variety of products, and volume of output. The combined output of these three accounts for more than seventy-five per cent of the total Greek production, which in 1934 totaled 19,830 metric tons. Three-fourths of this amount consisted of writing, book and wrapping papers; the remaining twenty-five per cent of bristols and other boards. No rag paper or newsprint is manufactured in Greece.

Greece is dependent for its supply of paper stock upon foreign countries. The plant at Aeghion, which is the largest in the country, obtains its paper making stocks chiefly from Sweden, Czechoslovakia, and Germany." —United States Commercial Attache K. L. Rankin, Athens. September 20, 1935.

GERMAN PAPER MANUFACTURING INDUSTRY ACTIVE

The upward trend noticeable in the German paper industry during 1935 continued during the early months of the current year, according to a recent report from W. S. Jesien, American Consulate General, Frankfort. After the usual depression of the post-holiday period, business picked up rapidly, attaining new high points of activity. In some divisions of the industry the usual seasonal slump failed to take place. An outstanding example is the manufacture of kraft paper and paper bags, which showed a 20 per cent higher rate of activity than in the corresponding period in 1935. Production of wrapping paper in general also showed a vigorous upward trend. Of great importance to the continued activity in this branch of the paper industry was the unusually mild winter which enabled road building and the construction of dwellings to be carried on almost without interruption. Cement sacks, kraft wrapping, tar roofing, hanging paper, building papers and felts, all derived benefit from this activity in the building industry. The demand and production of printing and writing papers was distinctly better than at this period in 1935.

An adverse factor with which the pulp and paper industry had to contend was the 5 per cent increase of the Reichbahn freight tariff. This hit particularly the specialized mills which have to purchase their raw materials. Considerable confusion was occasioned by the numerous disputes as to who is to shoulder the added freight burden, each branch of the industry endeavoring to pass it on to another.

The price advance for which manufacturers of printing and writing paper have been demanding government authorization for during the past year or more has finally been sanctioned, probably in acknowledgement of the new difficulty created for the paper industry, the freight tariff advance, mentioned in the preceding paragraph. The prices have been advanced 0.50 mark on newsprint, 0.75 mark on wood-containing book papers, and 1 mark on wood free printings and writings (per 100 kilograms). These increases represent an increase of about 2 per cent on former prices. Printing and writing papers are now quoted as follows, all prices per 100 kilos (220.46 pounds): Newsprint, grade Ia, weight 70 to 149 grams per square meter, 24.50 marks; wood-content writing, grade Ia, 27.50 marks; machine finish book, grade IV, 32.35 marks; writing, grade IV, 35.25 marks; wood-free writing 43.25 marks.

GERMAN WOOD PULP MILLS WORKING AT CAPACITY

No figures are available concerning the German wood pulp production, but according to trade papers this branch of industry worked at near capacity during the first quarter of 1936. The demand was declared to be so active as to prevent prompt deliveries. A new element in the wood pulp market is the demand from the rapidly expanding staple fiber mills, which use sulphite pulp as a raw material.

SHORTAGE OF OTHER PAPER BASE STOCKS

A shortage of rags and old paper for paper-manufacturing was particularly noticeable during the first quarter of 1936. A shortage in the supply of straw was complained of up to the middle of February, but since that time sufficient stocks appear to have been procurable. The supply of water power was steady and sufficient.—Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce.

GERMAN PRODUCTION AND EXPORTS OF PAPER AT HIGH LEVELS

German production of paper and board in 1935 established a new high record, according to a report from the American consulate-general, Frankfort-on-Main, made public by the Commerce Department.

On the basis of daily average production figures, it is estimated that Germany produced during the year 2,200,000 tons of paper and 550,000 tons of board. These figures exceed the previous peak totals of 1929 by 4 per cent and 25 per cent, respectively, the report states.

Exports of paper and board from Germany also attained notably high levels, statistics show. Foreign shipments of paper increased from 153,052 metric tons in 1934 to 225,796 tons in 1935, while exports of board advanced from 81,402 tons to 84,241 tons, it was stated.

In the development of German paper exports, overseas markets are of outstanding importance. Thus, the principal customer for German newsprint, book papers and tissue is China and for writing papers and papeterie China and South American countries. The most important European customer countries are Great Britain and Netherlands, according to the report.

In comparison with the very substantial exports, the size of Germany's paper imports is so small as to be a negligible factor. The paper industry, the report states, has thus become one of the most important sources of foreign exchange to the country.

GERMANY

Imports (Short Tons)

	Total Chemical	Mechanical	Total
1925	102,188	16,628	118,816
1926	68,521	2,384	70,905
1927	138,581	4,155	142,736
1928	166,606	18,170	184,776
1929	175,819	5,382	181,201
1930	158,539	937	159,476
1931	169,236	254	169,490
1932	123,345	68	123,413
1933	150,507	398	150,905
1934	158,831	265	158,996

Imports of Chemical Pulp (By Countries—Short Tons)

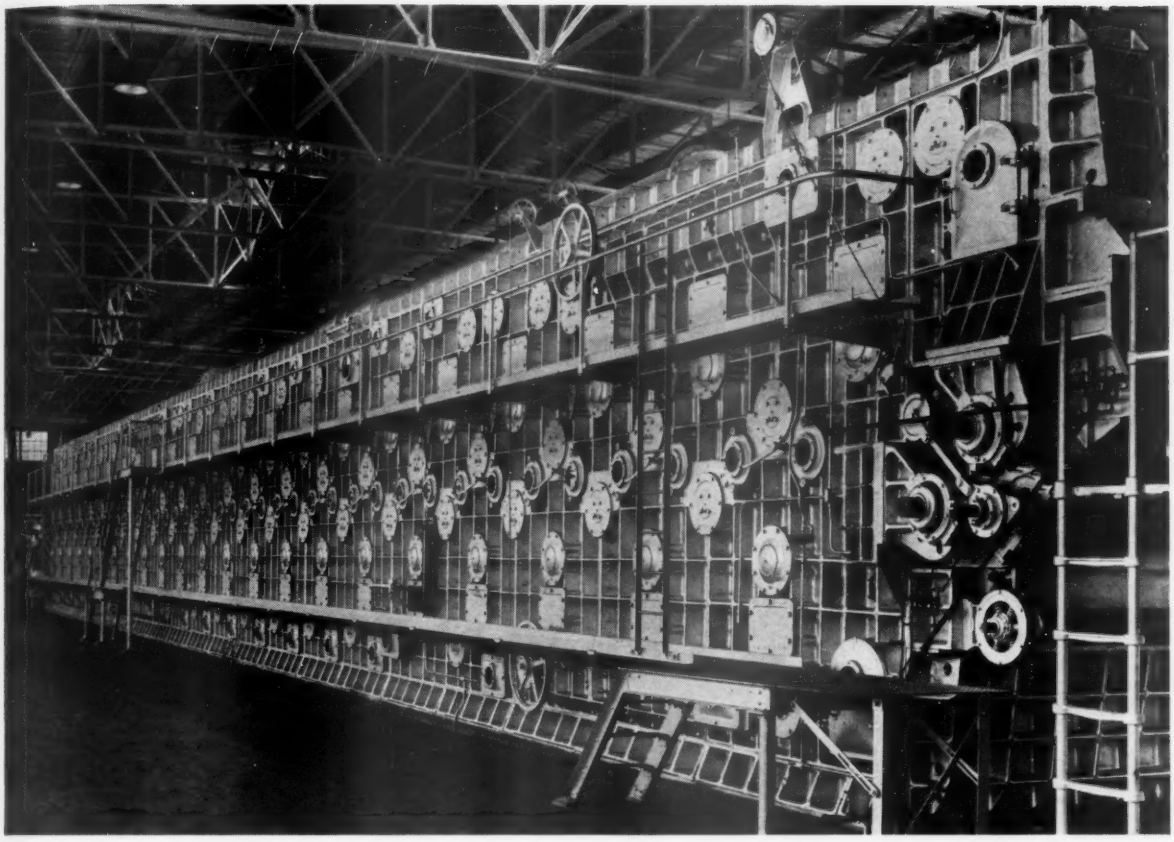
From	1934	1933	1932
Sweden	74,391	55,672	44,397
Finland	33,376	30,537	27,850
Czechoslovakia	21,873	34,384	24,858
Norway	11,426	.....	.....
Austria	9,224	.....	.....
Canada	5,288	.....	.....
Latvia	2,112	.....	.....
Others	1,041	.....	.....
Total	158,731	.....	.....

Source: Statistiches Amt, Monatliche Nachweise uber den Auswartigen Handel, Deutschlands.

Exports of Chemical Pulp (By Countries—Short Tons)

To	1934	1933	1932
France	91,376	81,351	80,962
United States	91,356	83,021	68,975
Great Britain	61,139	43,520	57,787
Netherlands	21,669	22,910	21,023
Italy	16,177	(1)	(1)
Belgium	(1)	15,667	25,912
Others	63,303	33,553	56,539
Total	345,020	280,022	311,198

Source: Germany, Statistiches Amt, Monatliche Nachweise uber den Auswartigen Handel.
(1) Included in Others.



THE MINTON VACUUM DRYER

After five years of experience with their first Vacuum Dryer the Weyerhaeuser Timber Company are now using a second and larger Vacuum Dryer in their new mill at Everett

Vacuum Dried Pulp is better pulp. It is cleaner, whiter, stronger, and more easily beaten. No other drying process can produce as good pulp.

Vacuum Dried *Paper* shows equally good qualities. The economy of Vacuum Drying is also an important item for you to consider.

The following list of Companies that have purchased MINTON VACUUM DRYERS for drying PULP is convincing evidence of the merit of the Vacuum Drying Process for this purpose.

Name of Company	Kind of Pulp	No. of Dryers	Diam. of Dryers	Face of Dryers
Brown Corp., Canada	Special Kraft	26	60	144
Buckeye Cotton Oil Co., U.S.A.	Cotton Linter	24	48	128
Olympic Forest Products Co., U.S.A.	Bleached Sulphite	40	60	152
Weyerhaeuser Timber Co., U.S.A.	Bleached Sulphite	36	60	152
Kymmene A/B., Finland	Bleached Sulphite	32	60	152
Enso Gutzeit O/Y., Finland	Kraft	48	60	152
WEYERHAEUSER TIMBER CO., U.S.A.	Unbleached Sulphite	44	60	152

The last two of the machines in the above list are in production and will each produce more than 240 tons of pulp per day. We believe they will be the largest machines for the production of paper, pulp, or board of any kind ever built in the history of the world.

THE MINTON VACUUM DRYER CORPORATION

Smith Building, GREENWICH, CONN., U. S. A.

GERMANY

Production (Short Tons)

	Sulphite						
	Bleached	Unbleached	Total	Sulphate	Total Chemical	Mechanical	Total
1913	.....	.....	925,300	26,338	.....	743,000	1,694,638
1920	106,703	330,690	437,393	21,500	.....	470,700	929,593
1925	268,596	654,100	922,696	27,809	950,505	812,100	1,762,605
1926	273,213	714,300	987,513	25,799	1,013,312	800,900	1,814,212
1927	313,031	775,133	1,088,164	32,303	1,120,467	892,900	2,013,367
1928	357,923	798,131	1,156,054	43,651	1,199,705	922,845	2,122,550
1929	391,007	820,514	1,211,521	51,252	1,262,773	938,727	2,201,500
1930	395,717	811,429	1,207,146	35,567	1,242,713	915,231	2,157,944
1931	.....	.....	987,573	31,398	1,018,971	840,783	1,859,754
1932	.....	.....	1,000,392	24,416	1,024,808	832,236	1,857,044
1933	.....	.....	1,023,596	34,281	1,057,877	854,282	1,912,159
1934	.....	.....	1,173,509	51,036	1,224,545	953,489	2,178,034

Source: Wirtschaftsgruppe der Papier, Pappen, Zeltstoff, und Holzstoff-Erzeugung, Berlin, Germany.

Consumption (Short Tons)

	Chemical	Mechanical	Total
1925	858,867	822,351	1,681,218
1926	830,152	788,097	1,618,249
1927	1,049,994	892,418	1,942,412
1928	1,109,177	937,797	2,046,974
1929	1,145,971	940,548	2,086,519
1930	1,084,331	910,587	1,994,918
1931	880,159	832,937	1,713,096
1932	836,955	825,728	1,662,683
1933	928,362	849,280	1,777,642
1934	1,038,256	950,447	1,988,703

Consumption equals production plus imports minus exports.

Exports (Short Tons)

	Total Chemical	Mechanical	Total
1925	193,826	6,377	200,203
1926	251,681	15,187	266,868
1927	209,054	4,637	213,691
1928	257,134	3,218	260,352
1929	292,621	3,561	296,182
1930	316,921	5,581	322,502
1931	308,048	8,100	316,148
1932	311,198	6,576	317,774
1933	280,022	5,400	285,422
1934	345,020	3,307	348,327

Source: Germany, Statistiches Amt, Monatliche Nachweise uber den Auswartigen Handel.

GREAT BRITAIN

	Production (Short Tons)	Consumption (Short Tons)		
	Chemical	Mechanical	Chemical	Total
1933	146,606	430,527	643,022	1,073,549
1925	128,969	459,650	694,090	1,153,740
1926	132,276	479,012	791,341	1,270,353
1927	159,833	451,761	677,963	1,129,724
1928	154,322	540,396	906,632	1,447,028
1929	171,959	491,672	848,165	1,339,837
1930	149,913	470,714	779,148	1,249,862
1931	143,299	571,150	919,865	1,491,015
1932	134,481	626,728	916,670	1,543,398

Production Source: League of Nations Statistical Year Book.
Consumption equals production plus imports and exports.

Imports (By Countries—Short Tons)

	Finland	Sweden	Norway	Germany	Canada	Others	Total
Bleached Chemical							
1933	38,324	19,563	19,930	9,699	.....	4,550	92,066
1934	48,541	23,021	24,797	13,261	.....	5,583	115,203
1935	55,545	23,371	27,220	8,792	.....	6,722	121,650
Unbleached Chemical							
1933	227,159	205,352	30,234	30,203	.....	44,191	537,139
1934	209,262	275,309	30,404	44,904	.....	48,989	608,868
1935	211,098	257,839	32,872	34,873	.....	74,823	611,505
Other Chemical—Wet							
1933	254,026	.....	.....	.....	.....	39,946	293,972
1934	279,210	.....	.....	.....	.....	86,352	383,562
1935	312,500	.....	.....	.....	.....	82,167	394,667
Mechanical							
1933	157,750	191,446	264,089	.....	7,641	5,802	626,728
1934	193,706	187,783	307,160	.....	9,424	9,167	707,240
1935	243,249	206,584	208,376	.....	18,259	3,518	679,986
Total							
1933	677,259	416,361	314,253	39,902	7,641	94,489	1,549,905
1934	748,719	486,113	362,361	58,165	9,424	150,091	1,814,873
1935	822,392	487,794	268,468	43,665	18,259	167,230	1,807,808

Source: Great Britain Statistical Department, Annual Statement of Trade.

PUMPS BY Bingham

Vertical
Decker Pump

Used exclusively in new Weyerhaeuser Mill at Everett, Wash.

Bingham Pumps, especially developed for the Pulp and Paper industry, have long been preferred by engineers and executives who insist upon proved dependability.

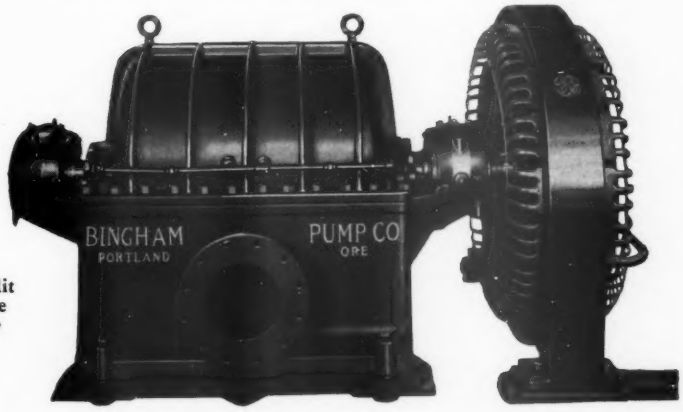
Considering that there are no "stand-by" units as emergency auxiliaries in this mill, is a real tribute to the rugged construction and absolute dependability of Bingham pumps.

Each Bingham pump in this installation was individually engineered to handle its particular job with a NEW HIGH in operating efficiency, reflecting in lowest horsepower consumption.

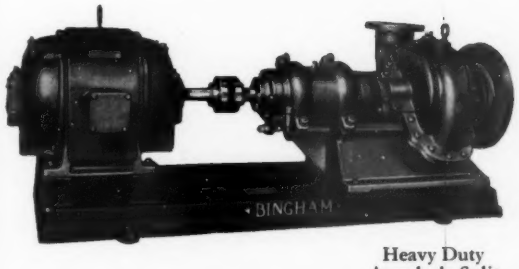
The illustrations on this page are but a few of the Bingham Pumps installed in the Everett plant.

Pulp and paper operators in ever-increasing numbers are turning to Bingham Pump Company because of their specialization in the hydraulic problems of this industry.

Even Flow
Vertical Screen
Transfer Pump



Horizontally Split
Shell Wet Type
Vacuum Pump



Heavy Duty
Angularly Split
Stock Pump

Specially constructed
Acid Pump for strong
Sulphite Acids at high
operating temperature

BINGHAM PUMP COMPANY PORTLAND OREGON

GREAT BRITAIN

Imports (Short Tons)

	Chemical					
	Bleached	Unbleached	Other	Total	Mechanical	Total
1920	32,980	573,593	7,771	614,344	317,825	932,169
1925	26,547	482,460	9,605	518,612	430,529	949,141
1926	28,112	522,280	13,355	563,747	459,660	1,023,407
1927	29,737	592,226	13,100	635,063	479,062	1,114,125
1928	37,051	477,200	11,266	525,517	452,017	977,534
1929	42,646	676,901	18,833	738,380	540,518	1,278,898
1930	46,568	618,603	34,666	699,837	491,672	1,191,509
1931	64,418	512,260	65,311	641,989	470,726	1,112,715
1932	86,089	571,474	133,110	790,673	572,010	1,362,683
1933	92,066	537,139	146,986	776,191	626,728	1,402,919
1934	115,203	608,868	190,736	914,807	707,240	1,622,047

Imports (Value in Pounds)

	Chemical				
	Bleached	Unbleached	Other	Mechanical	Total
1920	1,471,247	19,559,548	314,771	814,116	7,341,768
1925	467,171	5,551,420	103,500	47,362	3,142,451
1926	471,551	6,168,642	149,746	41,746	3,339,792
1927	480,486	7,024,563	149,893	27,073	3,305,673
1928	565,294	5,088,974	115,719	20,269	2,681,256
1929	655,526	6,969,483	185,315	22,883	3,066,671
1930	655,283	6,269,195	351,025	10,942	2,821,857
1931	740,699	4,554,340	562,247	17,462	2,587,734
1932	836,778	4,158,711	976,092	32,338	2,422,384
1933	861,725	3,594,341	961,073	20,832	2,503,669

Exports (Short Tons—Dry)

		Export of Imported Goods			
	Produce and Manufacture of the U. K.	Chemical			
		Bleached	Unbleached	Other	Mechanical	Total
1920	56	33	1,693	.....	596	2,378
1925	4	306	4,249	.....	2	4,561
1926	29	28	1,876	.....	10	1,943
1927	7	440	3,108	.....	50	3,605
1928	39	122	1,715	.....	256	2,132
1929	1	111	3,595	.....	122	3,829
1930	2	75	1,506	2	.....	1,585
1931	.....	412	5,693	35	12	6,152
1932	.....	1,197	4,092	.....	860	6,149
1933	.....	646	5,481	.....	.....	6,127

Source: Great Britain Statistical Department, Annual Statement of Trade.

HUNGARY

Production, None

Exports, None

Imports (Short Tons)

	Chemical	Mechanical	Total
1925	818	727	1,545
1926	1,380	1,731	3,111
1927	3,912	1,865	5,777
1928	5,057	2,822	7,879
1929	9,562	3,288	12,850
1930	11,713	4,454	16,167
1931	16,987	3,099	20,086
1932	21,812	3,985	25,797
1933	15,550	3,306	18,856

Imports (By Countries), 1933

	Chemical	Mechanical	Total
Austria	11,678	3,276	14,954
Czechoslovakia	2,847	19	2,866
Rumania	742	.....	742
Germany	257	11	268
Others	26	.....	26

Imports (By Value, in Pengos)

	Chemical	Mechanical
1927	1,100,190	236,908
1928	1,513,908	486,457
1929	3,378,080	662,058
1930	3,623,976	798,779
1931	5,993,064	406,055
1932	5,149,729	516,100

Source: Hungary, Statisztikai-Kulkereskekelmi Forgalom Magyar Statisztikai Kozlemenyek.

ITALY

Production, 1935

"Domestic production of wood pulp, the bulk of which is by the Groundwood process, totaled 54,553 tons, an increase of 5,664 tons over the first six months of 1934." (Reference is made to Production for the first six months of 1935)."

Imports, 1935

"In spite of quota restrictions on imports of wood pulp applied from the middle of February (1935), imports of both groundwood and chemical pulp show notable increases during the first six months of 1935 compared with the corresponding period of 1934. The quota on ground pulp was put at 25% of 1934 imports, that on chemical pulp at 35%. Nevertheless, receipts of ground pulp totaled 3,901 metric tons and those of chemical pulp 168,605 tons, representing an increase of 31% over the first half of 1934."

Sources for Production and Imports: U. S. Trade Commissioner E. Hume, Rome, October 20, 1935.

Expansion

"A Bill setting up a National Cellulose and Paper Board was approved at a Cabinet meeting in Rome last May (1935), and enacted into law June 13th. The new Board is designed primarily to increase domestic supplies of chemical pulp, particularly bleached chemical pulp, for the paper industry.

"Although production of rayon increased from 30 million kilos in 1930 to 48 million kilos last year (1934), it is stated that not more than one-fifth of the chemical pulp imports is taken by rayon industry. While at the present time it does not seem probable that the grades of chemical pulp required for the rayon industry can be produced in Italy, it is believed that production of chemical pulp for paper and explosives can be successfully developed. Available supplies of wood pulp are scarce, but considerable progress has already been made in the manufacture of chemical pulp from wheat and rice straw, esparto and other fibers."

Source: U. S. Trade Commissioner E. Hume, Rome, September 10, 1935.

INCREASED PRODUCTION BY ITALIAN PAPER INDUSTRY DURING 1935

Production by the Italian paper and board mills during 1935 is estimated at between 480,000 and 490,000 metric tons (metric ton equals 2,205 pounds), based on reported production during the first 8 months of the year in comparison with 1934. Of the 1935 estimates, 70,000 metric tons is credited to newsprint paper. This latter figure represents between 75 and 80 per cent of newsprint capacity, which is estimated at close to 90,000 metric tons. In view of present prices for newsprint and the fact that the paper must not exceed 50 grams per square meter in weight (approximately 31 pounds basis weight), it has not been found profitable to operate some of the smaller slower machines. The bulk of the output is produced by 3 mills operating a total of 6 machines with speeds varying from 180 to 250 meters per minute. The capacity of these 6 machines is estimated at 80,000 metric tons annually, which is sufficient for present domestic needs. Owing to the restrictions on imports of chemical pulp particularly, a marked reduction in the production of paper and board is looked for in 1936. In fact, it is stated that import licenses for chemical pulp in 1936 will not exceed 100,000 tons as against 225,000 tons imported for the paper industry in 1935. Eighty per cent of the chemical pulp imports will be taken from Austria.

At the same time a decided effort is being made to utilize to the utmost national pulp resources. Several new mills for the manufacture of ground wood are being planned, and greater use will be made of this class of pulp. (Imports of groundwood during the first 9 months of 1935 amounted to only 6,492 metric tons as against 263,758 tons of chemical pulp.) Rags and waste paper will also be utilized to a greater extent.

For these reasons, it is believed that during the current year production will be oriented more toward the cheaper grades of paper. Work is being rushed forward on the chemical pulp plant now under construction at Foggia, the capacity of which will be increased from 20 tons per day to 36 tons. At the same time plans are under consideration for the con-

WHEN... QUALITY COUNTS

CONSUMERS EVERYWHERE
ARE INSISTING
ON THE

HIGH GRADE
BLEACHED
SULPHITE
PULPS

MADE BY THREE
MODERN PACIFIC COAST MILLS

RAINIER PULP & PAPER CO.
SHELTON, WASHINGTON

GRAYS HARBOR PULP & PAPER CO.
HOQUIAM, WASHINGTON

OLYMPIC FOREST PRODUCTS CO.
PORT ANGELES, WASHINGTON

Annual Tonnage Available
in Excess of 125,000 Tons

struction of other plants which can use the chlorine process on annual plants. The chemical pulp mill at Tolmezzo, which utilizes fir as a basic raw material, is reported to be operating at capacity, and the output of the plant at Mantua is being increased.—(Trade Commissioner Elizabeth Humes, Rome.)

ITALY'S FOREIGN TRADE IN PULP AND PAPER—1935

Imports of wood pulp into Italy during the first 9 months of 1935 totaled 270,250 metric tons as against 195,916 tons during the corresponding period in 1934. The bulk of these receipts consist of chemical pulp which accounted for 263,758 tons of the 1935 imports and 192,167 tons of the 1934 imports. Imports of chemical pulp from Austria rose from 54,910 tons during the first 9 months of 1934 to 92,927 tons during the corresponding period last year, at the same time shifting Austria from second place as a source of supply for this class of pulp. Sweden dropped from first to second place last year, although its shipments rose from 69,899 to 88,039 tons. Other notable sources of supply in 1935 were: Finland, 35,154 tons; Germany, 15,676 tons, and Czechoslovakia, 10,960 tons. Canada also supplied 3,113 tons.

Italian imports of paper during the first 9 months of 1935 dropped to 7,884 tons as compared with 10,727 tons during the corresponding period in 1934, a decrease of 27 per cent. The decline was most marked in imports of newsprint paper, which dropped from 5,015 to 2,752 tons. Imports of boards, on the other hand, rose from 7,481 to 8,589 tons, ascribed largely to increased takings of imitation leather. Austria and Germany are the leading sources of supply of white and pulp-dyed papers, which amounted to 6,026 tons, or about 76 per cent of the 1935 receipts in this line. Imports from the former amounted to 2,918 tons, or nearly one-half of the total receipts, and from the latter 1,248 tons, or more than one-fifth of such receipts. The remaining imports came largely from Sweden and Czechoslovakia. The United States is credited with supplying 29 tons.

Cigarette paper, unlined and unglazed white paper, and straw paper makes up the bulk of the Italian paper exports, accounting in 1935 for 3,928 tons out of a total of 5,678 tons of paper. The first two items were the only ones on the paper schedule to show an increase during the first 9 months of 1935 compared with the corresponding period in 1934. Paper exports as a whole show a drop from 6,502 tons during the first 9 months of 1934 to 5,678 tons during the corresponding period last year. —(Trade Commissioner E. Humes, Rome.)

INCREASE IN ITALIAN TRADE WITH THE UNITED STATES

Italy imported 1,336 metric tons of chemical pulp, 718 tons of paper and board, and 28 tons of converted paper products from the United States during the first 9 months of 1935. Purchases of the first items from the United States weer almost double those for the corresponding period of 1934. At the same time, the relatively small shipments of Italian paper to the United States, i. e., 67 tons, were about 30 per cent below the 1934 figure. Italy was, however, able to register an important increase in exports of paper and board manufactures to the United States, this particular item having increased from 21 tons during the first 9 months of 1934 to 554 tons for the corresponding period of 1935.—(Trade Commissioner E. Humes, Rome.)

ITALY

	Production (Short Tons)			Consumption (Short Tons)		
	Chemical	Mechanical	Total	Chemical	Mechanical	Total
1927	3,307	108,797	112,104	129,795	118,785	248,580
1928	4,409	125,000	129,409	189,714	136,361	326,075
1929	2,205	131,124	133,329	218,649	139,972	358,621
1930	2,205	137,049	139,254	199,182	143,468	342,650
1931	6,614	142,197	148,811	196,540	146,567	343,107
1932	7,716	144,401	152,117	206,780	148,406	355,186

Consumption equals Production plus Imports minus Exports.
Source: Mechanical, 1927, 1929-1932, Istituto Nazionale per L'Esportazione, October, 1933, Rome. 1928, estimated. Chemical, League of National Statistical Year Book.

	Imports (Short Tons)			Imports (By Value, in 1,000s of lire)		
	Chemical	Mechanical	Total	Chemical	Mechanical	Total
1925	153,370	13,630	167,000	241,757	9,456	251,213
1926	151,419	9,268	160,687	260,893	6,787	267,680
1927	126,488	9,988	136,476	164,376	4,973	169,349
1928	185,305	11,361	196,666	205,842	5,939	211,781
1929	216,444	8,848	225,292	252,338	5,159	257,497
1930	196,977	6,419	203,396	216,826	3,586	220,412
1931	189,926	4,370	194,296	172,287	1,615	173,902
1932	199,064	4,005	203,069	121,387	1,187	122,574
1933	241,171	6,362	247,533	131,079	1,675	132,754
1934	280,691	5,590	286,281	148,040	1,441	149,481

Source: Annuario Statistico Italiano, Istituto Centrale di Statistica del Regno D'Italia, Rome.

Exports, None

Imports (By Countries of Chemical Pulp) (Short Tons)

	Sweden	Austria	Finland	Others	Total
1929	68,894	68,453	16,534	62,563	216,444
1930	56,989	65,256	13,889	60,843	196,977
1931	60,186	68,232	12,015	49,493	189,926
1932	65,102	56,579	28,975	48,408	199,064
1933	89,063	72,936	40,472	38,700	241,171
1934	102,734	80,137	45,084	52,736	280,691

Source: Annuario Statistico Italiano, Istituto Centrale di Statistica del Regno D'Italia, Rome.

JAPAN

Production (Short Tons)

	Sulphite	Sulphate	Other Chemical	Total Chemical	Mechanical	Total
1913	.....	.....	.....	.....	.....	85,844
1925	.....	.....	.....	.....	.....	457,130
1926	.....	.....	.....	.....	.....	551,482
1927	.....	.....	.....	.....	.....	591,263
1928	341,735	22,383	.....	364,118	261,469	625,587
1929	369,751	28,795	.....	398,546	283,338	681,884
1930	371,642	31,308	.....	402,950	286,580	689,530
1931	319,855	33,123	.....	352,978	271,705	624,683
1932	305,985	35,038	.....	341,023	266,477	607,500
1933	342,398	44,251	1,412	388,061	295,409	683,470
1934	.....	.....	.....	.....	.....	767,818

Source: Japan Year Book, Foreign Affairs Association of Japan.

	Total Imports	Total Consumption*
1920	52,348	.....
1925	85,362	542,492
1926	69,611	621,093
1927	78,595	669,858
1928	80,627	706,214
1929	88,636	770,520
1930	91,171	780,701
1931	113,279	737,962
1932	112,682	720,182
1933	179,125	862,595
1934	252,292	1,020,110
1935	301,607	.....

*Consumption equals Production plus Imports minus Exports.
Source: Annual Return of the Foreign Trade of Japan, Department of Finance, Tokyo.

Imports

"The relation of imports to domestic production progressed from 25.8% in 1933 to 35% in 1934—but that is due to the development of the artificial silk industry. One can estimate that 30% of pulp importations in 1933 were destined to that industry and that that percentage increased to 45% in 1934."—Le Moniteur, May 1, 1935.

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for

SULPHITE PULP

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Mines: Gulf, Newgulf and Long Point, Texas

JAPAN

Imports (By Countries—Short Tons)

	Sweden	Norway	United States	Canada	Others	Total
1931	18,024	24,176	24,760	30,130	16,189	113,279
1932	15,220	11,510	22,477	54,842	8,633	112,682
1933	29,078	34,871	49,952	52,144	13,080	179,125
1934	52,953	44,263	93,591	44,970	16,515	252,292
1935	56,524	54,206	121,841	39,396	30,640	301,607

Imports (By Value, in 1,000 yen)

	Sweden	Norway	United States	Canada	Others and Total
1931	1,792	4,115	3,951	3,144	15,328
1932	1,220	2,013	2,418	5,200	11,840
1933	3,571	7,577	7,801	6,043	27,066
1934	7,438	10,464	16,464	7,245	44,265

Source: Annual Return of the Foreign Trade of Japan, Department of Finance, Tokyo.

Expansion

"The Nihon Rayon Pulp Company, which started operations on June 1, 1935, with an initial capacity of 30,000 metric tons of high grade bleached sulphite, is expected to double its present capacity, producing kraft as well as sulphite pulp."

Report of the U. S. Trade Commissioner in Tokyo, October 1, 1935.

Japan's Imports of Wood Pulp Larger during 1935

"November (1935) imports of wood pulp, amounting to 19,972 short tons, included 10,662 tons for the use of paper manufacturers and 9,310 for rayon production. The United States supplied 7,865 tons, or 39 per cent, of the November receipts. Total imports during the first eleven months of 1935 amounted to 276,739 tons, an increase of 32 per cent over the corresponding period in 1934."

Office of the American Commercial Attache, Tokyo, January 20, 1936

The Bureau of Foreign & Domestic Commerce, United States Department of Commerce, reported on the Japanese pulp situation for the first quarter of 1936 as follows:

Production of chemical and mechanical wood pulp in Japan during the first three months of 1936 totaled 176,738 short tons, a slight decrease from the previous quarter's total and exceeding by 3 per cent production during the first quarter of 1935. Actual output of both classes of pulp during the first quarters of 1935 and 1936, respectively, was as follows: Chemical, 89,402 and 93,002 tons; mechanical, 81,660 and 83,736 tons.

Imports of wood pulp into Japan during the first quarter of the current year totaled 88,321 tons, thereby setting a new all-time record for any calendar quarter. Arrivals exceeded imports during the last quarter of 1935 by 27 per cent and during the corresponding quarter in 1935 by 6 per cent. Imports of pulp for the manufacture of rayon, amounting to 33,345 tons, were 6½ per cent under those for the corresponding period last year, reflecting the effect of the rayon control scheme, which limits production to 30 per cent of capacity, as well as the fact that stocks on hand at the end of February were the largest yet received. Imports of pulp for papermaking, on the other, were 18½ per cent larger than during the corresponding period last year.

During the first quarter of the current year the United States supplied 47 per cent of the total volume imported, Sweden ranking second and Norway third as sources of supply; only 7 per cent of the total imports came from Canada. Arrivals of wood pulp from the United States have increased steadily, receipts for the first quarter showing a gain of 20 per cent compared with the corresponding three months in 1935, and 142 per cent over the first quarter of 1934.

LATVIA

Production (Short Tons)

	Chemical	Mechanical	Total
1925	.....	.....	7,721
1926	.....	.....	15,339
1927	.....	.....	17,669
1928	.....	.....	20,986
1929	.....	.....	22,765
1930	22,539	4,401	26,940
1931	5,508	1,496	7,004
1932	14,527	2,772	17,299
1933	21,215	2,930	24,145
1934	14,414	8,886	23,300

Imports (Short Tons)

	Chemical	Mechanical	Other Chemical	Total
1925	3,180	.....	.....	3,180
1926	1,904	.....	.....	1,904
1927	2,578	.....	.....	2,578
1928	2,596	.....	.....	2,596
1929	3,155	.....	.....	3,155
1930	2,758			2,758
1931	5,299	277	293	5,869
1932	2,134	50	36	2,220
1933	3,096		.....	3,096
1934	3,236	57	.....	3,293

Exports

	(All Chemical)	Total Consumption
1925	34	10,867
1926	1,975	15,268
1927	7,662	12,585
1928	7,863	15,719
1929	6,059	19,861
1930	5,999	23,699
1931	1,925	10,948
1932	3,821	15,698
1933	4,562	22,679
1934	5,307	21,086

Pproduction Source: 1930-1934, Latvigas Statistiska Gada Gramata, Valsts Statistiska Parvalde.

Imports and Exports Source: Latvigas Areja Terdznieciba, Valsts Statistiska Parvalde.

Consumption Source: Consumption equals Production plus Imports minus Exports.

LITHUANIA

Imports—Mechanical—(Short Tons)	
1928	0
1929	0
1930	0
1931	0
1932	191
1933	754
1934	1,074

Exports—Chemical—(Short Tons)	
1928	52,778
1929	66,999
1930	59,412
1931	39,873
1932	43,413
1933	52,635
1934	63,199

Exports to:	1933
Great Britain	17,520
United States	16,958
Argentine	8,160
Spain	3,359
Italy	3,244

Source: Lietuvos Uzsienio Prekyba, Centralinis Statistikos Buiras.

Production: No official statistics on production of wood pulp available.

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LOS ANGELES — BUNKER HILL PRODUCTS PURE LEAD - LEAD ALLOYS — OAKLAND

SAN FRANCISCO

NETHERLANDS

Imports (Short Tons)

	Sulphite	Sulphate	Total Chemical	Mechanical	Total
1925	.....	.....	44,645	14,700	59,345
1926	.....	.....	48,123	10,409	58,532
1927	.....	.....	57,161	14,212	71,373
1928	.....	.....	63,194	15,971	79,165
1929	.....	.....	73,995	27,091	101,086
1930	71,605	4,044	75,649	14,763	90,412
1931	86,243	5,805	92,048	12,822	104,870
1932	75,899	2,331	78,230	13,190	91,420
1933	79,970	6,508	86,478	16,591	103,069
1934	75,275	12,092	87,349	13,726	101,075

Source: Nederland, Maandstatiek Van den in-int-en doorvoer, Centraal Bureau voor de Statistiek.

Imports (By Countries and Value*)

Sulphite: Tons	Sweden	Germany	Norway	Finland	Canada	Others	Total
1934	24,447	21,435	8,054	12,556	6,943	1,822	75,257
1933	24,523	22,988	10,605	13,102	7,451	1,301	79,970
Value							
1934	1,534	1,121	619	585	592	137	4,588
1933	1,476	1,325	692	594	782	84	4,953
Sulphate:							
Tons							
1934	10,002	175	.....	1,777	.....	138	12,092
1933	5,509	.....	515	432	.....	52	6,508
Value							
1934	311	13	.....	58	.....	8	390
1933	153	.....	19	17	.....	3	192
Mechanical:							
Tons							
1934	2,834	.....	10,765	.....	56	71	13,726
1933	3,258	.....	12,899	.....	.....	434	16,591
Value							
1934	46	.....	177	.....	6	3	232
1933	61	.....	229	.....	.....	16	306
Total:							
Tons							
1934	37,283	21,610	18,819	14,333	6,999	2,031	101,075
1933	33,290	22,988	24,019	13,534	7,451	1,787	103,069
Value							
1934	1,891	1,134	796	643	598	148	5,210
1933	1,690	1,325	940	611	782	103	5,451

*Value in 1,000 guilders.
Source: Nederland, Maandstatiek Van den in-int-en doorvoer, Centraal Bureau voor de Statistiek.

NETHERLANDS

Production (1) (Short Tons)

	Chemical	Mechanical	Total
1925	41,887	30,684	72,751
1926	46,297	36,376	82,673
1927	49,603	41,887	91,490
1928	51,808	46,297	98,105
1929	52,910	48,501	101,411
1930	47,399	54,012	101,411
1931	46,297	54,012	100,309
1932	44,092	62,831	106,923
1933	44,092	63,933	108,025
1934	39,683	71,650	111,333

Source: League of Nations Statistical Year Book. (No Government figures available on Production of wood pulp.)
(1) Includes pulp made from straw.

Consumption (Short Tons)

	Chemical	Mechanical	Total
1925	79,273	45,542	124,815
1926	84,155	46,763	130,918
1927	96,740	56,099	152,839
1928	107,188	59,987	167,175
1929	120,116	72,787	192,903
1930	122,831	68,249	191,080
1931	138,011	66,789	204,800
1932	121,930	75,943	197,873
1933	130,171	80,524	210,695
1934	126,252	85,174	211,426

Consumption equals Production plus Imports minus Export.

Exports (Short Tons)

	Total Chemical	Mechanical	Total
1925	7,259	22	7,281
1926	10,265	22	10,287
1927	10,024	0	10,024
1928	7,814	2,281	10,095
1929	6,789	2,805	9,594
1930	217	526	743
1931	334	45	379
1932	392	78	470
1933	399	0	399
1934	780	202	982

Source: Nederland, Maandstatiek Van den in-int-en en doorvoer, Centraal Bureau voor de Statistiek.

NORWAY

Production (Short Tons)

	Sulphite: Bleached	Sulphite: Unbleached	Sulphite: Total	Unbleached Sulphate	Total Chemical	Mechanical	Total
1925	.....	.....	347,776	62,981	410,757	485,000	895,757
1926	.....	.....	303,640	60,334	363,974	465,171	829,145
1927	.....	.....	343,993	66,645	410,638	491,611	902,249
1928	177,021	193,860	370,881	75,467	446,348	526,263	972,611
1929	171,113	239,681	410,794	81,910	492,702	563,222	1,055,926
1930	194,536	197,736	392,272	72,655	464,927	561,767	1,026,694
1931	96,300	90,178	186,478	33,262	219,740	387,876	607,616
1932	218,412	180,628	399,040	61,587	460,627	531,387	992,014
1933	227,263	145,330	372,593	60,765	433,358	509,334	942,692
1934	.....	.....	410,000	.....	.....	.....	.....
1935	.....	.....	400,000	.....	.....	.....	.....

Source: Statistiske Centralbyrra-Norges Officielle Statistikk, Norway.

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California Redwood

Western Red Cedar

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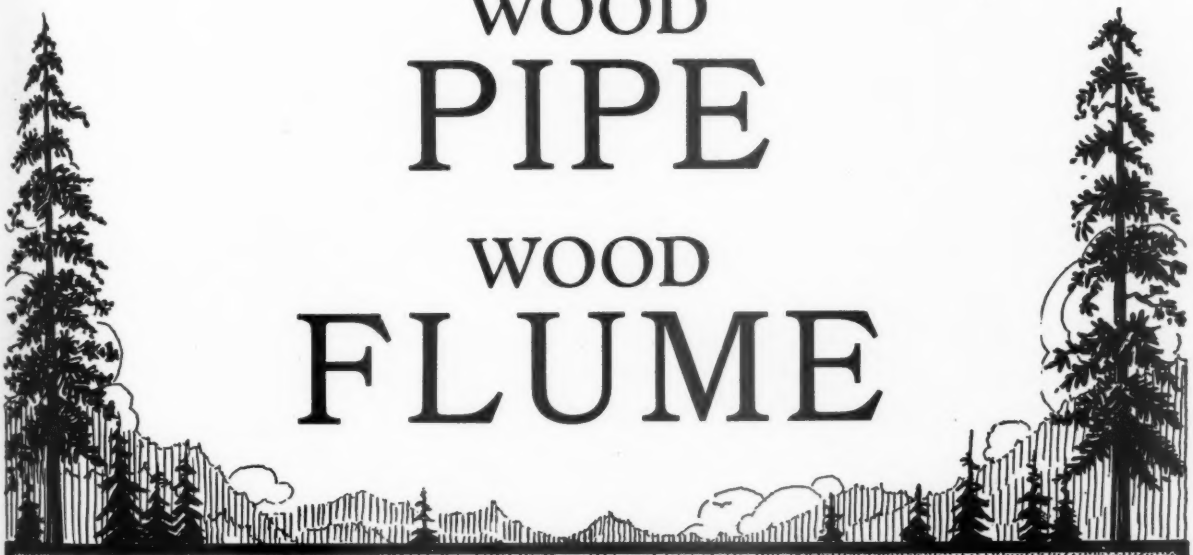

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NORWAY

Wood Pulp Produced for Sale (Short Tons)

	Sulphite			Unbleached	Total		
	Bleached	Unbleached	Total	Sulphate	Chemical	Mechanical	Total
1928	143,590	162,244	305,362	28,362	334,196	370,841	705,037
1929	165,094	170,847	335,941	30,293	366,234	396,830	763,064
1930	130,954	155,489	286,443	23,624	310,067	378,395	688,462
1931	81,479	67,352	148,831	7,958	156,789	288,261	445,050
1932	184,288	145,694	329,982	20,465	350,447	357,999	708,466
1933	191,761	117,679	309,440	19,134	328,574	347,154	675,728

Source: Statistiske Centralbyrra, Norges Officielle Statistikk, Norway.

Consumption (Short Tons)

	Total Chemical	Mechanical	Total
1925	166,970	183,629	350,599
1926	138,284	209,259	347,543
1927	171,581	243,107	414,688
1928	167,702	254,246	421,948
1929	202,329	247,547	449,876
1930	222,740	236,353	459,093
1931	99,229	108,837	208,066
1932	188,130	203,214	391,344
1933	190,861	189,949	380,810

Imports (Short Tons)

	Total Chemical	Mechanical	Total
1925	16,847	30,139	46,986
1926	10,773	25,983	36,756
1927	13,489	26,816	40,305
1928	12,607	18,254	30,861
1929	12,457	17,114	29,571
1930	17,575	12,776	30,351
1931	20,714	7,675	28,389
1932	12,550	9,447	21,997
1933	25,131	7,378	32,509

Consumption equals Production plus Imports minus Exports.
Source: Norway, Statistikk Centralbyraa, Statistik Arbok.

NORWAY

Exports (Short Tons)

	Sulphite			Unbleached	Total			
	Bleached	Unbleached	Total	Sulphate	Chemical	Mechanical	Total	Value*
1925	125,348	114,309	239,657	20,977	260,634	331,510	592,144	161,456
1926	113,604	103,324	216,928	19,535	236,463	281,895	518,358	117,048
1927	125,888	105,204	231,092	21,454	252,546	275,320	527,866	94,493
1928	143,738	120,002	263,740	27,513	291,253	290,271	581,524	93,292
1929	144,838	129,526	274,364	28,468	302,832	332,789	635,621	98,732
1930	151,470	84,898	236,367	23,394	259,762	338,190	597,952	89,139
1931	89,778	43,825	133,603	7,622	141,225	286,714	427,939	53,143
1932	172,698	93,459	266,157	18,890	285,047	337,620	622,667	76,954
1933	177,705	70,906	248,611	19,017	267,628	326,763	594,391	68,704
1934	197,256	63,372	260,628	14,649	275,277	385,908	661,185	79,365
1935	222,880	66,304	289,184	24,640	313,824	264,320	578,144	.....

*Value of exports in 1,000 kronor.

Exports by Countries (Short Tons), 1934

	Sulphite		Unbleached	Total		Total
	Bleached	Unbleached	Sulphate	Chemical	Mechanical	All Grades
Great Britain	41,661	25,698	789	68,148	304,584	372,732
United States	49,298	22,126	12,277	83,701	2,467	86,168
France	14,664	2,122	57	16,843	40,204	57,047
Japan	45,224	1,893	.....	47,117	.....	47,117
Belgium	4,195	823	105	5,123	20,279	25,402
Holland	6,846	884	.....	7,730	5,500	13,230
Spain	6,392	442	32	6,866	5,546	12,412
Germany	10,555	518	1,204	12,277	.....	12,277
Italy	9,504	.....	.....	9,504	239	9,743
Sweden	1,074	354	184	1,612	627	2,239
Denmark	151	.....	.....	151	3,957	4,108
Czechoslovakia	1,809	.....	.....	1,809	.....	1,809
Ireland	1	2,240	.....	2,241	.....	2,241
Portugal	61	.....	.....	61	157	218
Greece	1,006	.....	.....	1,006	.....	1,006
British India	817	4,816	.....	5,633	55	5,688
China	18	113	.....	131	.....	131
Mexico	247	559	.....	806	.....	806
Cuba	168	.....	.....	168	.....	168
Brazil	1,298	447	.....	1,745	1,661	3,406
Argentina	1,344	.....	.....	1,344	409	1,753
Uruguay	.....	.....	.....	.....	223	223
Chile	.....	151	.....	151	.....	151
Australia	851	112	.....	963	.....	963
Others	72	74	1	147	.....	147
	197,256	63,372	14,649	275,277	385,908	661,185

Source: Norway, Statistik Centralbyraa, Norges Officielle Statistikk.

Exports to United States

1935	52,407	16,539	17,356	86,298	7,006	93,304

Total value of Norwegian pulp exports to U. S. (all grades) in 1935, $3,837,380; 1934, $4,130,710.

NEWFOUNDLAND

Production (Short Tons)

	Chemical	Mechanical	Total
1925	38,580	121,253	159,833
1926	50,706	156,527	207,233
1927	58,422	177,470	235,892
1928	57,320	174,163	231,483
1929	55,115	176,368	231,483
1930	65,036	222,665	287,701
1931	60,626	220,460	281,086
1932	51,808	211,642	263,450
1933	42,990	222,665	265,655
1934	49,603	356,836	306,439

Practically all of Newfoundland's production is for her own consumption.
Source: League of Nations Statistical Year Book.

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POLAND

Production (Short Tons)

	Sulphite				Total		
	Bleached	Unbleached	Total	Sulphate	Chemical	Mechanical	Total
1927	.....	.....	43,375	14,700	58,075	35,274	93,349
1928	.....	.....	46,275	18,300	64,575	41,887	106,462
1929	.....	.....	54,222	16,105	70,327	50,044	120,371
1930	7,383	46,043	53,426	16,096	69,522	49,493	119,015
1931	8,249	42,490	50,739	17,855	68,594	38,244	106,838
1932	.....	.....	49,253	12,552	61,805	40,785	102,590
1933	.....	.....	51,846	11,883	63,729	45,465	109,194
1934	.....	.....	60,626	18,739	79,365	51,846	131,211

Source: Glowny Urzad Statystyczny—Concise Statistical Yearbook, and Statystyka Przemyslowa—L'Office Central de Statistique de la Republic Polonaise—Poland.

Consumption (Short Tons)

	Chemical	Mechanical	Total
1927	59,029	41,543	100,572
1928	63,888	49,852	113,740
1929	80,383	52,606	132,989
1930	78,298	51,602	129,900
1931	64,777	38,915	103,692
1932	60,233	41,333	101,566
1933	62,839	45,991	108,830
1934	83,994	52,167	136,161

Consumption equals production plus imports minus exports.

Imports and Exports (Short Tons)

	Imports			Exports		
	Mechanical	Chemical	Total	Mechanical	Chemical	Total
1925	2,440	.....	.....	24	.....	.....
1926	3,421	.....	.....	13	.....	.....
1927	6,269	10,629	16,898	.....	9,675	9,675
1928	7,965	9,985	17,950	.....	10,672	10,672
1929	2,810	19,237	22,047	248	9,181	9,429
1930	2,414	22,025	24,439	305	13,249	13,554
1931	841	13,518	14,359	170	17,335	17,505
1932	548	7,475	8,023	.....	9,047	9,047
1933	542	8,255	8,797	16	9,145	9,161
1934	321	9,085	9,406	.....	4,456	4,456

Source: Poland—Glowny Urzad Statystyczny—Handel Zagraniczny.

ROUMANIA

Production (Short Tons)

	Total Chemical	Mechanical	Total
1925	29,620	5,670	35,290
1926	27,200	5,872	33,072
1927	26,665	5,944	32,609
1928	32,911	5,722	38,633
1929	35,733	6,439	42,172
1930	40,403	6,241	46,644
1931	32,614	8,380	40,994
1932	25,353	9,921	35,274
1933	29,762	11,023	40,785
1934	39,683	9,921	49,604

Source: 1925-1931—Roumania Institutional Statistica Generala Buletinul Statistic General.

1932-1934—League of Nations Statistical Year Book.

RUSSIA

Production (Short Tons)

	Chemical	Mechanical	Total
1924-1925	60,626	61,729	122,355
1925-1926	74,956	77,161	152,117
1926-1927	83,334	80,688	164,022
1927-1928	94,798	92,593	187,391
1928-1929	139,000	166,337	305,337
1930	189,596	233,467	423,063
1931	203,925	246,695	450,620
1932	204,146	276,457	480,603
1933	227,404	305,447	532,851
1934	260,033	323,932*	783,965

*Partially estimated.

Source: U. S. S. R. Central Statistical Department—Socialist Construction—Year Book.

Imports

	By Quantity (Short Tons)	By Value (1000 rubles)	Consumption (Short Tons)
1926-1927	95,333	8,528	259,355
1927-1928	80,692	6,155	268,083
1928-1929	63,820	5,538	369,157
1930	83,716	5,715	506,779
1931	75,379	2,483	525,999
1932	3,560	207	484,163
1933	2,476	87	535,327
1934	3,287	.....	787,252

Source: Official Customs Statistics of U. S. S. R.

Exports—None.

Capacity

"The two new mills for the production of sulphite cellulose at Archangel are reported to be approaching completion. They will use all the wood waste from the saw and wood working mills in that town and environs and are designed for an annual output capacity of 86,500 tons.

"A third mill with a capacity of 100,000 tons of cellulose, is being established at Segosy, in Carelia, while two other mills, with an individual productive capacity of 70,000 tons, are to be established next year at Kotala, on the Dwina and in Perm respectively."—The World's Paper Trade Review, November 15, 1935.

"A new mill for the manufacture of Kraft cellulose with an annual capacity of 16,000 tons is now under construction at Archangel. Plans have also been completed for the construction of four large wood pulp combines in the Northern region. Each of these mills will have a capacity of 100,000 tons of cellulose a year. At present there exists only one Kraft cellulose mill in the U. S. S. R. with a yearly output of 2,500 tons.—Economic Review of the Soviet Union, April, 1934.

SOUTHERN RHODESIA

"After over four years of investigation it has been decided to create in Southern Rhodesia a pulp and paper making industry.

"Quick growing trees are to be planted extensively on a very large property at Inyanga, on the eastern border of the colony.

"The Pinus Insignis will be planted chiefly, and from this class of wood good quality newsprint and wrapping paper can be made. For such paper there is a considerable and growing demand in South Africa and the East which is now being supplied by Canada and Scandinavia. There is at present no such industry in the African sub-continent.

"Large scale planting operations have already commenced. It is intended to plant 2,000 acres annually, which should provide sufficient pulpwood for mills with an output of 60,000 tons of paper a year.

"Besides the remarkably rapid growth of the trees in this part of Rhodesia, other advantages claimed for the scheme are that land and hydro-electric power are remarkably cheap, and labour is plentiful."—The Paper-Maker and British Paper Trade Journal, November 1, 1935.

SPAIN

Production—No official production figures available.

Capacity—30,680 tons of wood pulp per year according to Dean's 1935 "Paper-Maker's Directory of all Nations."

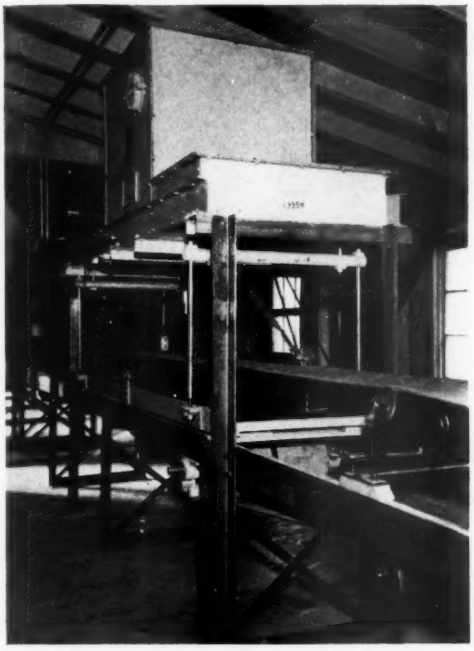
Imports (Short Tons)

	Total Chemical	Mechanical	Total
1925	62,127	19,505	81,632
1926	58,704	20,176	78,880
1927	52,530	20,460	72,990
1928	71,798	27,818	99,616
1929	87,359	31,863	119,222
1930	77,963	31,826	109,789
1931	79,447	39,754	119,201
1932	84,166	28,975	113,141
1933	89,690	36,197	125,887
1934	109,167	40,625	149,792

(Sweden leading source of supply)

Source: Spain—Instituto Geografico, Catastral y de Estadistica—Annuario Estadistico.

7 MERRICK WEIGHTOMETERS



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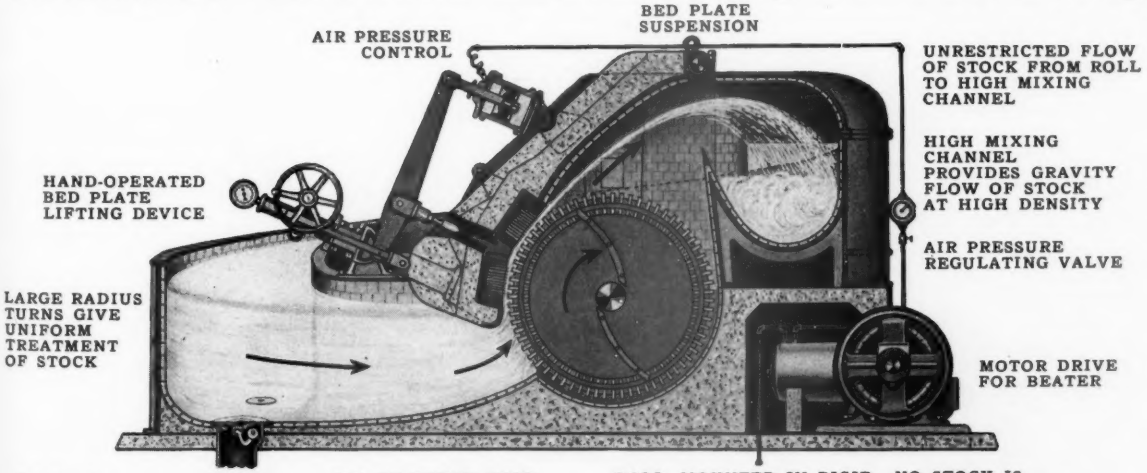
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YUGOSLAVIA

Production

No government statistics are available on production of wood pulp in Yugoslavia. The Trade Year Book of Yugoslavia for 1935 states there are seven factories manufacturing wood pulp in that country.

	Imports (1)		Exports of Chemical Pulp	
	Short Tons	Value in 1,000 dinars	Short Tons	Value in 1,000 dinars
1926	14,325	21,294	9,476	23,482
1927	17,525	24,191	11,617	30,467
1928	24,130	33,420	15,481	32,178
1929	26,268	44,509	13,664	26,494
1930	22,814	36,013	11,090(2)	18,846
1931	18,208	28,373	10,114	12,479
1932	8,663	13,250	3,063	3,121
1933	12,123	19,293	162	159
1934	18,552	30,769	11	12

(1) Chiefly Mechanical but includes some straw pulp.
(2) 16 tons of this is Mechanical—all the rest Chemical.

Imports Source: Yugoslavia, Generalna Direkcija Carina.

Imports by Countries

	1934		1933
	Short Tons	Value in 1,000 dinars	Short Tons
Austria	9,725	13,169	9,169
Czechoslovakia	6,348	12,374	1,075
Roumania	1,173	2,787	992
Sweden	979	1,576	669
Germany	119	245	145
Hungary	17	39	.....
Finland	161	350	17
France	30	229	16
Others	0	0	40

SWEDEN

Production (Short Tons)

	Sulphite			Sulphate		Total Chemical	Mechanical	Total
	Bleached	Unbleached	Total	Bleached	Unbleached			
1925	120,575	940,399	1,060,974	0	365,685	1,426,659	483,846	1,910,505
1926	133,816	1,029,921	1,163,737	0	434,050	1,597,787	525,257	2,123,044
1927	161,386	1,068,992	1,230,378	0	498,952	1,729,330	577,275	2,306,605
1928	139,173	884,883	1,024,056	0	473,971	1,498,027	595,923	2,093,950
1929	201,238	1,157,038	1,358,276	0	716,338	2,074,614	725,596	2,800,210
1930	198,414	1,158,620	1,357,034	0	686,358	2,043,392	636,546	2,679,938
1931	190,897	952,651	1,143,548	1,142	672,855	1,817,815	604,718	2,422,533
1932	210,816	755,059	965,875	9,723	675,783	1,651,381	549,161	2,200,542
1933	252,571	1,050,194	1,302,765	23,257	825,259	2,151,281	673,263	2,824,544
1934	286,598	1,129,857	1,416,455		981,047	2,397,502	708,779	3,106,281

Source: Sweden—Statistika Central Byran, Industri Berattelse.

CAPACITY

	Production as % of Capacity	
	Sulphite	Sulphate
1927	100%	100%
1928	80%	80%
1929	100%	100%
1930	97%	84%
1931	77%	78%
1932	63%	72%
1933	85%	86%

Source: Annual Number, Sweden, Wood Pulp Journal, 1934.
Source: Calculated from production values given in official statistics.

AVERAGE PRICE IN GOLD FRANCS

	Per Metric Ton	
	Chemical	Mechanical
1925	282.71	150.22
1926	297.65	153.18
1927	278.51	130.57
1928	266.76	120.57
1929	260.61	124.17
1930	234.46	118.44
1931	205.99	99.64
1932	130.91	59.01
1933	114.45	55.23

Expansion

"Stora Kopparbergs Bergslags A. B. has now begun the long planned enlargement of its Skutskar Sulphate mill. We are informed that its output capacity will at the same time be increased from the present 26,000 tons to about 50,000 tons of strong, bleaching and unbleached Sulphate pulp per annum. The whole new plant is expected to be ready for work towards the end of 1936."—Svensk Pappersmasse, Tidning, Nov. 15, 1935.

SWEDEN

Exports (Short Tons)

	Sulphite	Sulphate	Total Chemical	Mechanical	Total
1925	802,695	273,714	1,076,409	233,019	1,309,428
1926	850,424	346,813	1,197,237	238,658	1,435,895
1927	946,876	383,204	1,330,080	273,465	1,603,545
1928	785,609	368,296	1,153,905	308,651	1,462,556
1929	1,043,209	557,780	1,600,989	360,331	1,961,320
1930	1,008,418	509,210	1,517,628	290,756	1,808,384
1931	867,577	566,004	1,433,581	293,894	1,727,475
1932	716,942	464,186	1,181,128	243,381	1,424,509
1933	1,038,394	727,074	1,765,468	346,208	2,111,676
1934	1,065,723	785,210	1,850,933	352,530	2,203,463
1935	1,155,344	846,656	2,002,000	351,015	2,353,015

Source: Sveriges Varuntforsel Till Olika Lander av Kommerskollegium.

(Consumption (Short Tons)

	Sulphite	Sulphate	Total Chemical	Mechanical	Total
1925	260,664	93,553	354,217	254,821	609,038
1926	314,827	87,646	402,473	287,598	690,071
1927	285,256	116,194	401,450	303,879	705,329
1928	241,942	105,985	347,927	287,435	635,362
1929	319,335	159,422	478,757	365,320	844,077
1930	350,858	177,679	528,537	345,845	874,382
1931	279,870	109,652	389,522	310,950	700,472
1932	253,105	222,328	475,433	306,956	782,389
1933	270,535	122,293	392,828	327,533	720,361
1934	355,037	196,708	551,745	357,500	909,245

Consumption equals production plus imports minus exports.

Imports (Short Tons)

	Sulphite			Sulphate			Total		
	Bleached	Unbleached	Total	Bleached	Unbleached	Total	Mechanical	Chemical	Total
1925	2,356'	29	2,385	308	1,274	1,582	3,944	3,967	7,961
1926	1,475	39	1,514	318	91	409	999	1,923	2,922
1927	1,675	79	1,754	250	196	446	69	2,200	2,269
1928	2,524	971	3,495	277	33	310	163	3,805	3,968
1929	2,870	1,398	4,268	752	112	864	55	5,132	5,187

Weyerhaeuser Prevents Wood Decay

with **NO-D-K**

WOOD PRESERVATIVE

NO-D-K was used on the entire water filter plant, on all wood tanks and wood pipe, on the roofs, on the piling caps and on all wood in contact either with the ground or water.

NO-D-K PROTECTS WOOD FROM DECAY AND INSECTS AT VERY LOW COST. One gallon will cover thoroughly 60 to 80 square feet with two coats. NO-D-K penetrates deeply, is non-caustic, is insoluble in water and has an attractive dark brown color.

NO-D-K is easily applied with brush or spray.

For Complete Details Write

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Tennessee Eastman Corporation

KINGSPORT, TENNESSEE

Pacific Coast Distributors—The Paraffine Companies, Inc.
San Francisco, Los Angeles, Portland, Seattle

Automatic Wire Binding Machines

for the

PULP and PAPER INDUSTRY

Insuring---

SPEED with SAFETY -- ECONOMY and SECURITY

No Loose ends to catch on projections or other packages. No torn hands.
Packages stack perfectly, work perfectly on conveyors using belts or rollers,
and slide perfectly on gravity conveyors.

Manufactured Under Pioneer and Basic Patents — Other Patents Pending
Machines Sold Without Wire Contract

\+ + +

PARKER - LEAVER - EVANS WIRE TIE

5844 Birch Court, OAKLAND, CALIFORNIA

1930	2,152	90	2,242	79	452	531	55	2,773	2,828
1931	.....	.....	3,999	.....	.....	1,389	126	5,288	5,414
1932	.....	.....	4,172	.....	.....	1,008	1,176	5,180	6,356
1933	.....	996	6,164	.....	.....	851	478	7,015	7,493
1934	3,309	996	4,305	634	237	871	1,251	5,176	6,427

Source: Sveriges Variunforsel Frau Olika Lander—Kommerskollegium. 1934—Bilaga Till Kommersiella Meddelanden.

SWEDEN

Exports from Sweden, 1934 (Short Tons)

TO:	Mechanical	Sulphite Bleached	Sulphite Unbleached	Sulphate Bleached	Sulphate Unbleached	Total
United States	14,307	49,891	324,596	32,625	372,275	793,694
Great Britain	201,071	22,187	182,420	2,248	106,172	514,098
France	82,917	29,878	93,391	1,171	37,901	245,258
Italy	240	47,834	32,194	74	30,999	111,341
Spain	34,796	10,126	40,636	783	12,439	98,780
Germany	244	10,395	17,648	643	48,437	77,367
Japan	.....	4,196	16,691	.....	31,659	52,546
Belgium	4,546	11,227	20,143	723	14,223	50,862
Holland	1,652	11,371	16,100	990	15,470	45,583
Australia	280	1,700	4,087	64	24,639	30,770
Brazil	2,817	7,266	12,189	40	7,666	29,978
Denmark	1,711	488	17,359	.....	4,330	23,888
Mexico	318	2,709	12,193	12	6,290	21,522
Norway	2,397	3,710	5,531	147	2,854	14,639
Argentine	731	1,378	5,807	88	4,654	12,658
Greece	3,014	3,557	3,779	210	464	11,024
Chile	402	3,304	4,019	.....	2,125	9,850
Switzerland	.....	3,688	416	150	4,935	9,189
British East India	11	1,836	4,655	11	.....	6,513
Cuba	.....	.....	2,827	.....	3,640	6,467
Portugal	550	725	3,892	22	766	5,955
Poland and Danzig	.....	5,587	156	.....	87	5,830
British North America	.....	840	1,758	575	1,680	4,853
Uruguay	.....	113	1,265	.....	2,163	3,541
Irish Free State	.....	828	2,240	.....	.....	3,068
North Ireland	.....	576	1,344	.....	671	2,591
Bulgaria	425	168	851	.....	.....	1,444
Roumania	.....	.....	.....	.....	1,382	1,382
China	.....	119	414	.....	117	650
Dutch East India	11	.....	.....	.....	22	33
Bolivia	.....	.....	11	.....	.....	11
Venezuela	.....	.....	247	.....	559	806
New Zealand	.....	.....	.....	.....	4,161	4,161
Esthonia	.....	168	.....	.....	.....	168
Latvia	.....	448	.....	.....	246	694
Lithuania	35	112	.....	.....	3	150
Czechoslovakia	.....	226	22	.....	352	600
Jugo Slavia	.....	33	113	.....	839	985
British South Africa	.....	.....	45	.....	414	459
Egypt	55	.....	.....	.....	.....	55
	352,530	236,684	829,039	40,576	744,634	2,203,463

Source: Sveriges Varuntforsel Till Olika Lander av Kommerskollegium

SWITZERLAND

Production (Short Tons) Consumption (Short Tons)

	Production: Total Chemical	Production: Mechanical	Production: Total	Consumption: Total Chemical	Consumption: Mechanical	Consumption: Total
1925	44,092	25,353	69,445	42,003	27,195	69,198
1926	46,297	26,455	72,752	45,648	26,401	72,049
1927	45,194	27,558	72,752	44,111	26,454	70,565
1928	50,706	33,069	83,775	51,184	33,704	84,888
1929	49,603	33,069	82,672	55,371	32,071	87,442
1930	46,297	38,580	84,877	56,686	36,907	93,593
1931	40,785	33,069	73,854	56,267	30,560	86,827
1932	39,683	33,069	72,752	45,894	31,116	77,010
1933	44,092	33,069	77,161	53,732	31,660	85,392
1934	46,297	38,580	84,877	64,992	37,519	102,511

Consumption equals production plus imports minus exports.
Production Source: League of Nations Statistical Year Book—Estimated data. (No government figures on production of wood pulp.)

Imports (Short Tons)

	Chemical Bleached	Chemical Unbleached	Chemical Total	Mechanical	Total
1925	2,537	4,692	7,229	3,526	10,755
1926	3,660	6,258	9,918	1,641	11,559
1927	4,486	6,123	10,609	351	10,960
1928	4,597	8,894	13,491	2,674	16,165
1929	5,741	9,604	15,345	910	16,255
1930	6,491	10,610	17,101	386	17,487
1931	8,021	13,353	21,374	165	21,539
1932	3,940	9,515	13,455	200	13,655
1933	4,732	10,553	15,285	158	15,443
1934	8,720	12,388	21,108	169	21,277

Exports (Short Tons)

	Chemical Bleached	Chemical Unbleached	Chemical Total	Mechanical	Total
1925	7,359	1,959	9,318	1,684	11,002
1926	8,684	1,883	10,567	1,695	12,262
1927	9,569	2,123	11,692	1,455	13,147
1928	8,583	4,430	13,013	2,039	15,052
1929	6,542	3,035	9,577	1,908	11,485
1930	4,054	2,658	6,712	2,059	8,771
1931	3,146	2,746	5,892	2,674	8,566
1932	1,935	5,309	7,244	2,153	9,397
1933	1,947	3,698	5,645	1,567	7,212
1934	1,572	841	2,413	1,230	3,643

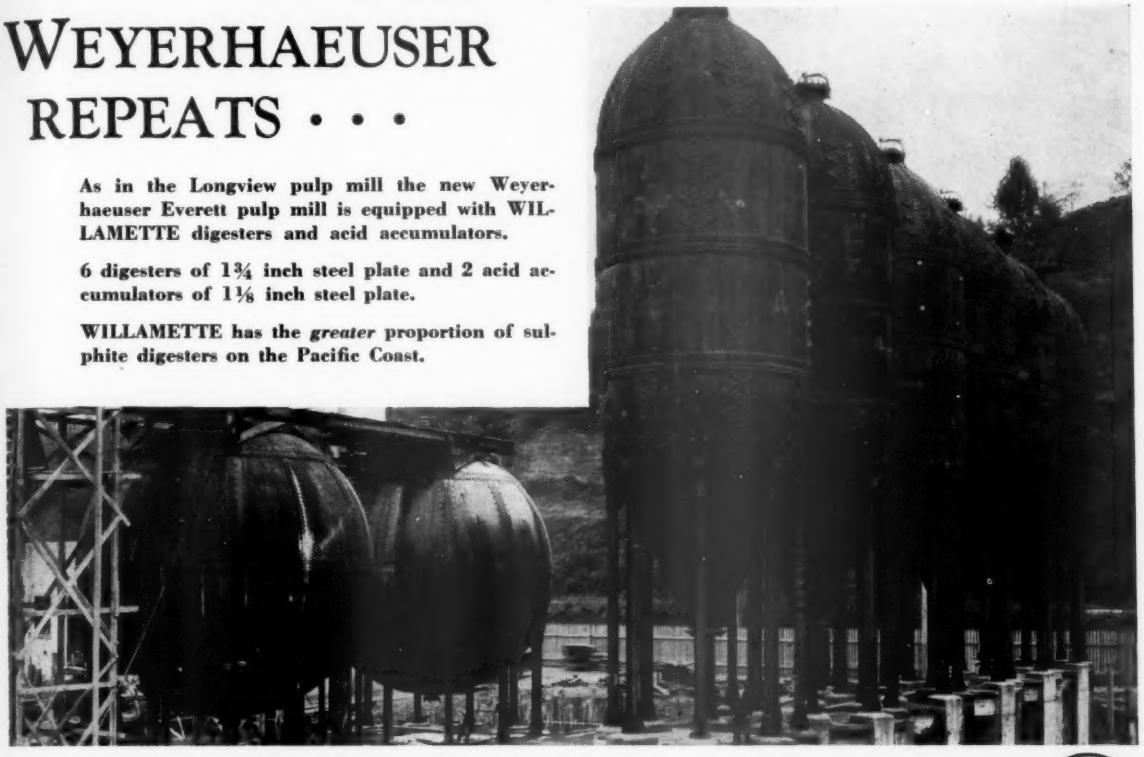
Source: Switzerland Zoll Department, Statistik des Auswartigen Handels.

WEYERHAEUSER REPEATS • • •

As in the Longview pulp mill the new Weyerhaeuser Everett pulp mill is equipped with WILLAMETTE digesters and acid accumulators.

6 digesters of 1¾ inch steel plate and 2 acid accumulators of 1⅛ inch steel plate.

WILLAMETTE has the *greater* proportion of sulphite digesters on the Pacific Coast.



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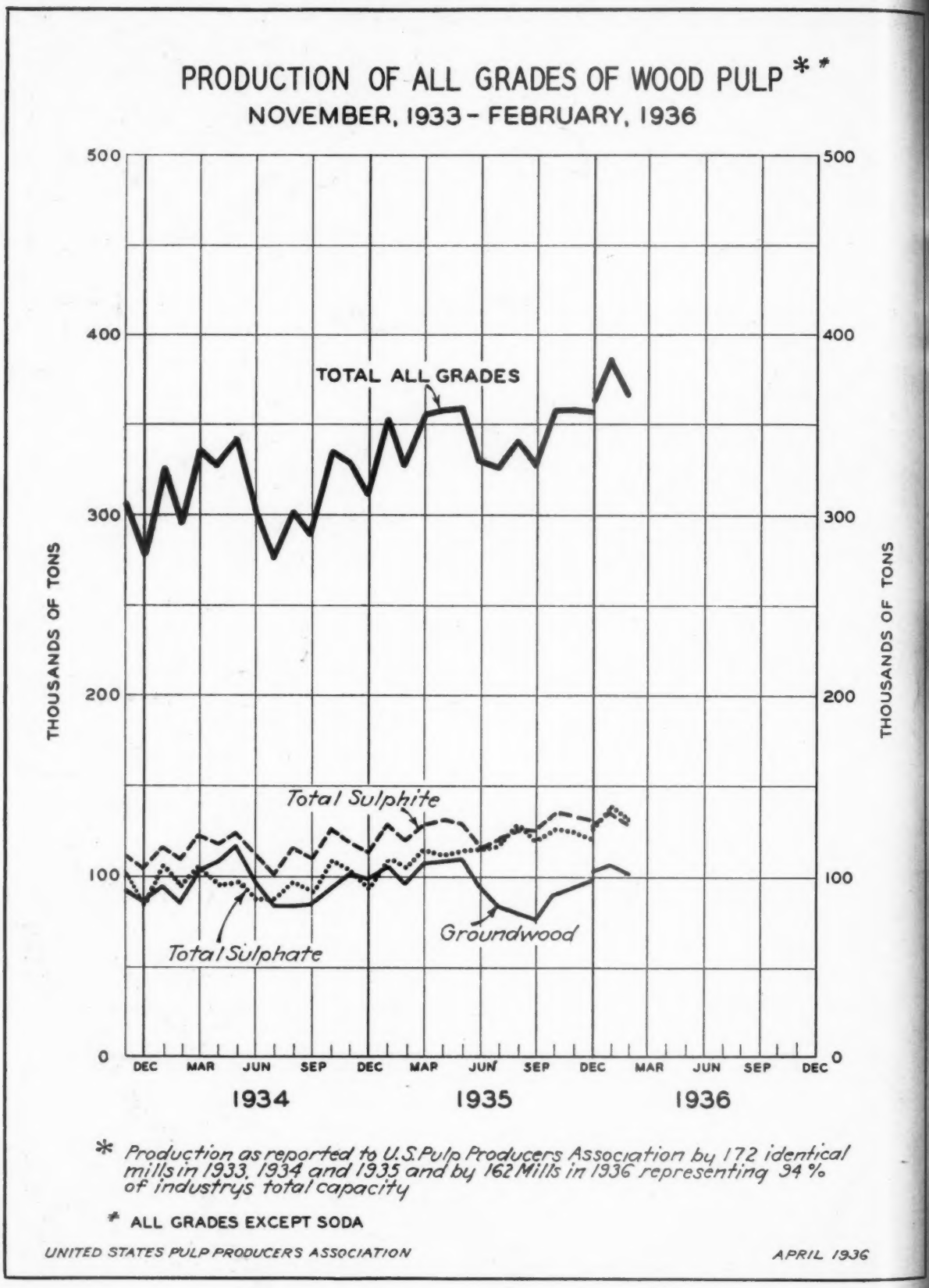
PRODUCTION OF ALL GRADES OF WOOD PULP * *
NOVEMBER, 1933 - FEBRUARY, 1936
THOUSANDS OF TONS
500
400
300
200
100
0
TOTAL ALL GRADES
Total Sulphite
Total Sulphate
Groundwood
DEC MAR JUN SEP DEC MAR JUN SEP DEC MAR JUN SEP DEC
1934
1935
1936
* Production as reported to U.S. Pulp Producers Association by 172 identical mills in 1933, 1934 and 1935 and by 162 Mills in 1936 representing 94 % of industrys total capacity
* ALL GRADES EXCEPT SODA
UNITED STATES PULP PRODUCERS ASSOCIATION
APRIL 1936